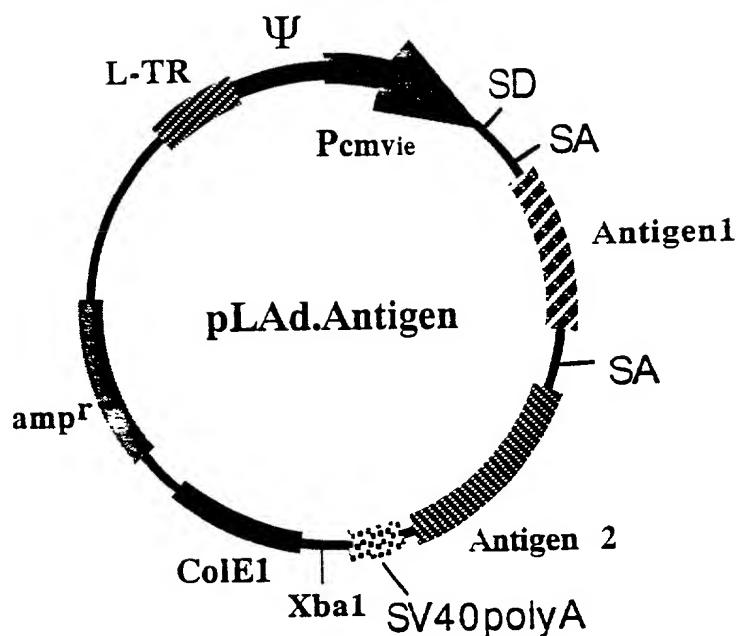


**FIGURE 1A**



**FIGURE 1B**

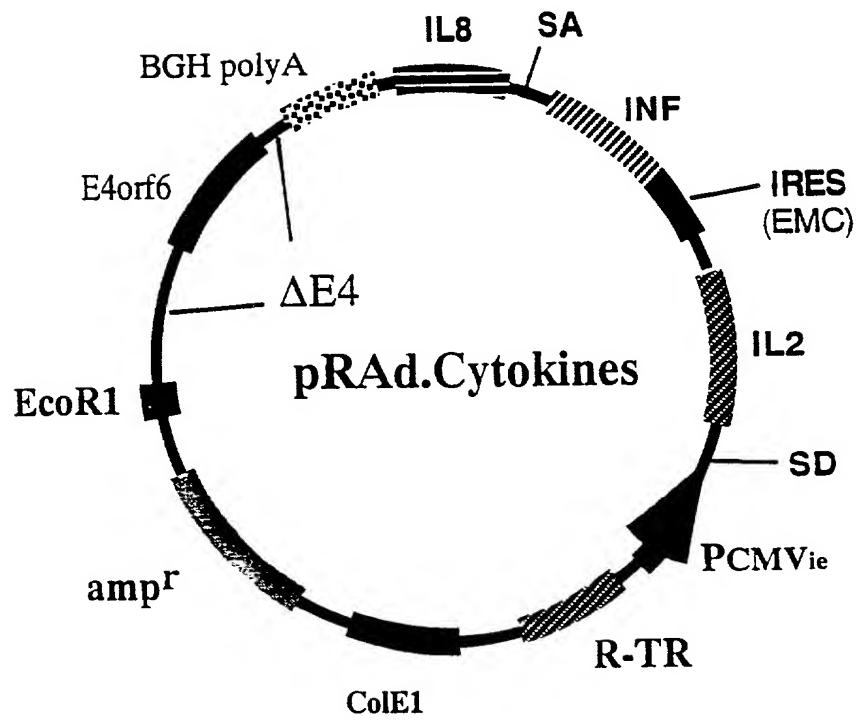
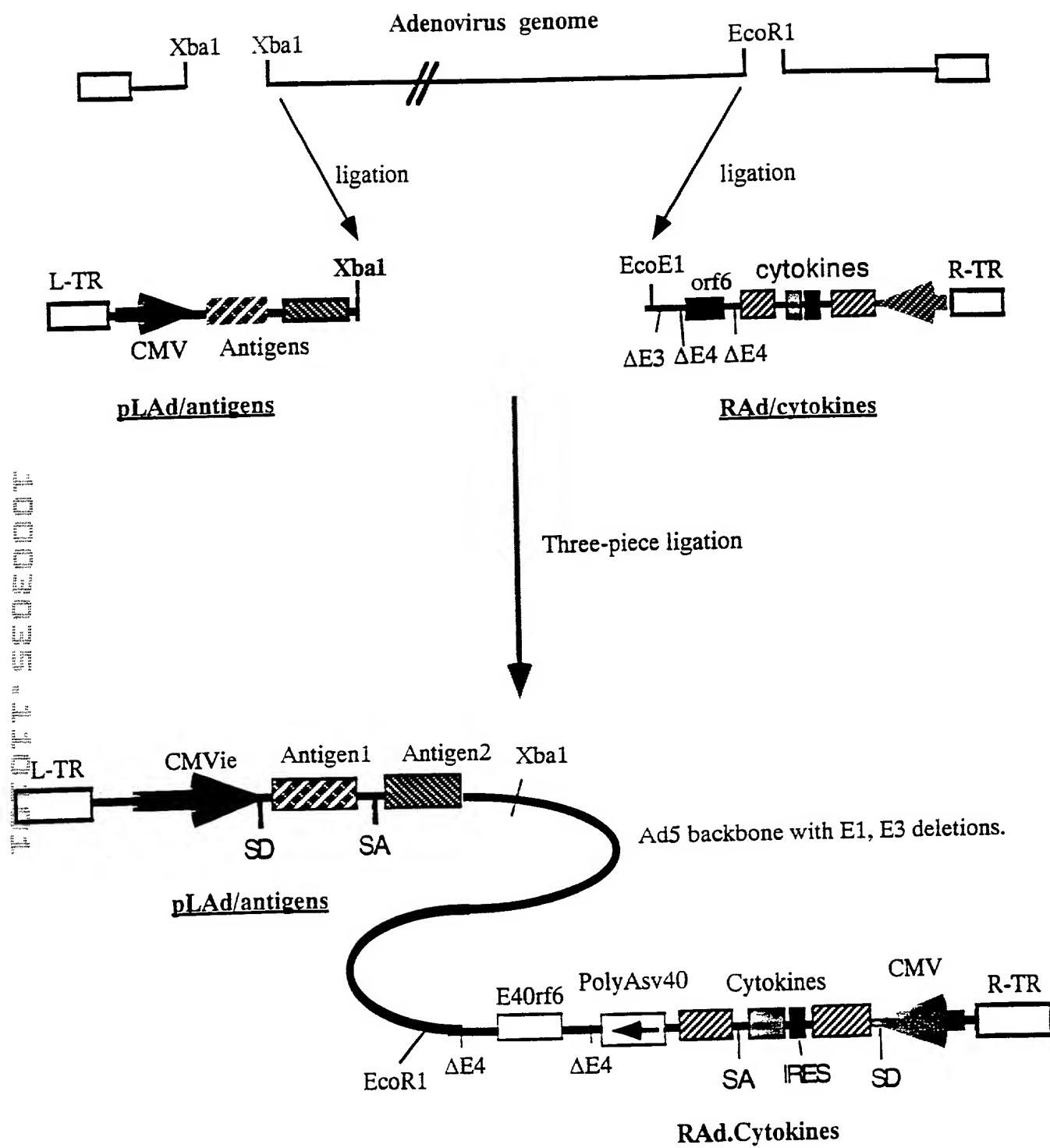
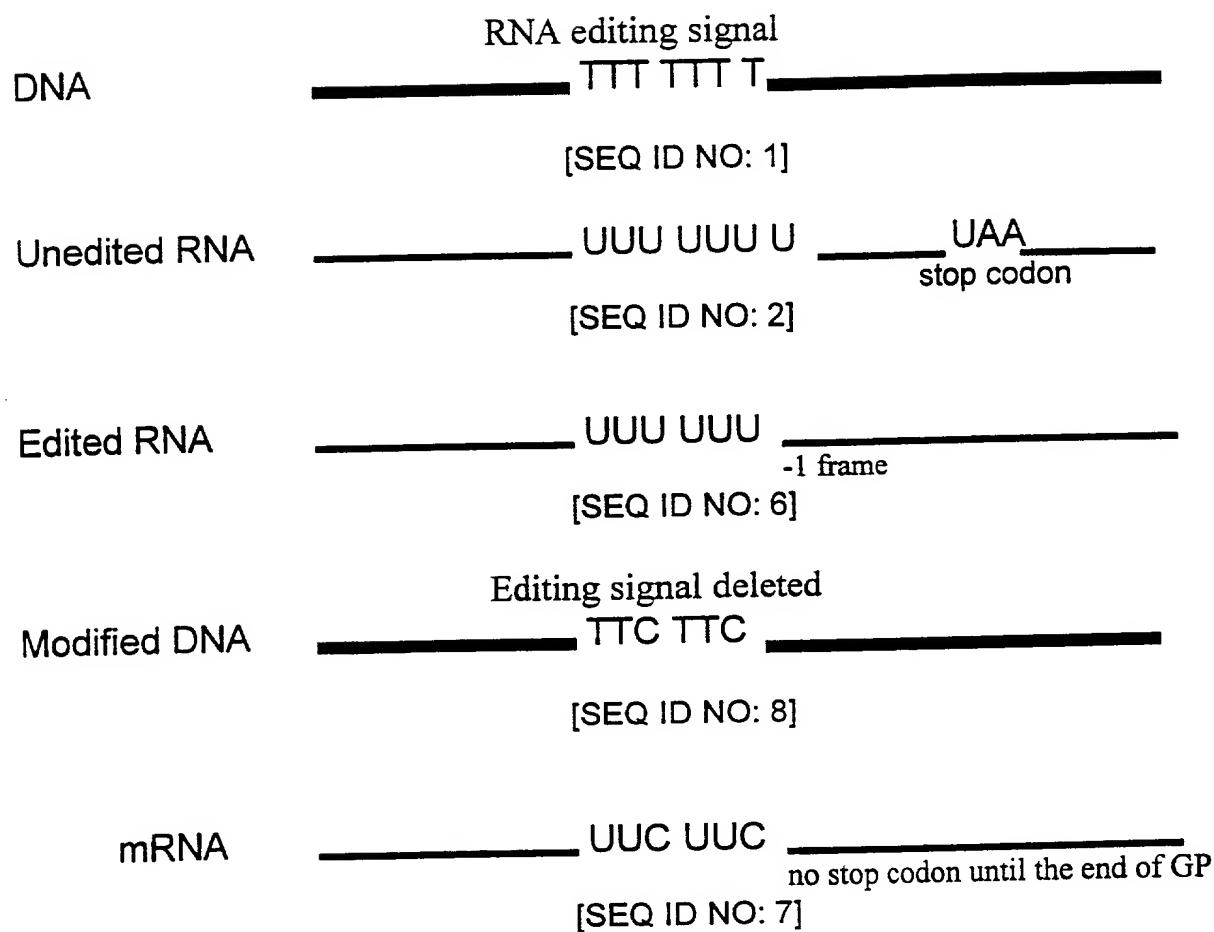
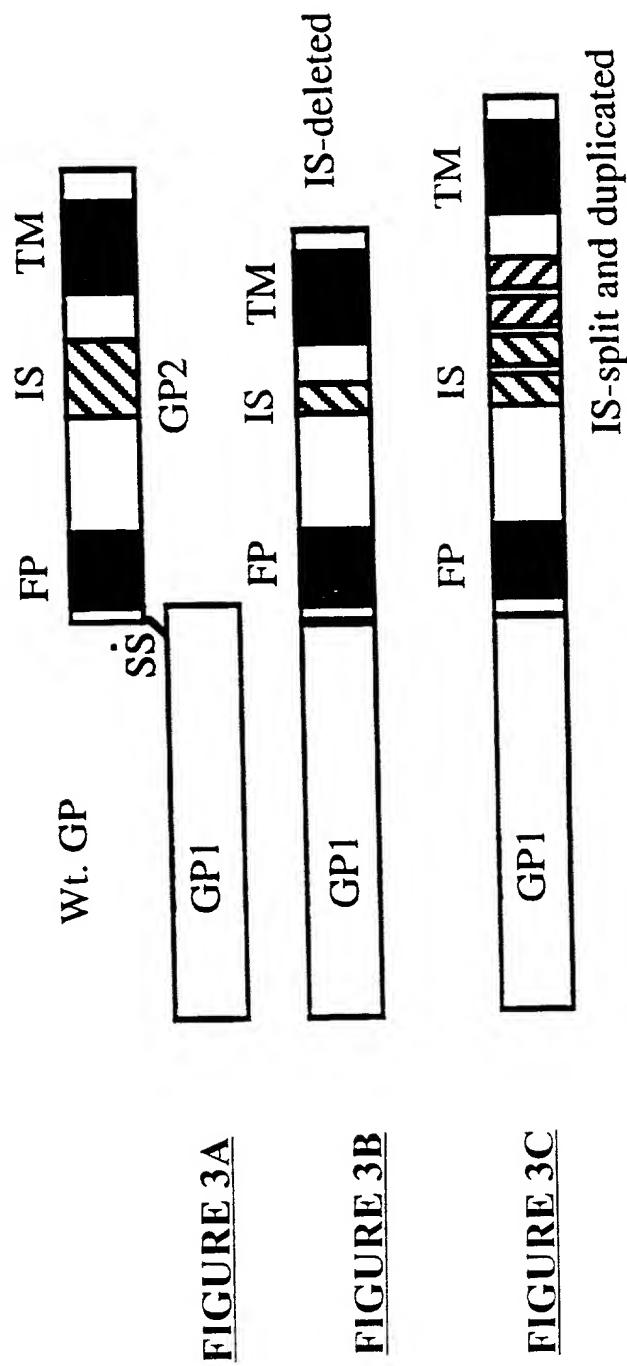


FIGURE 1C

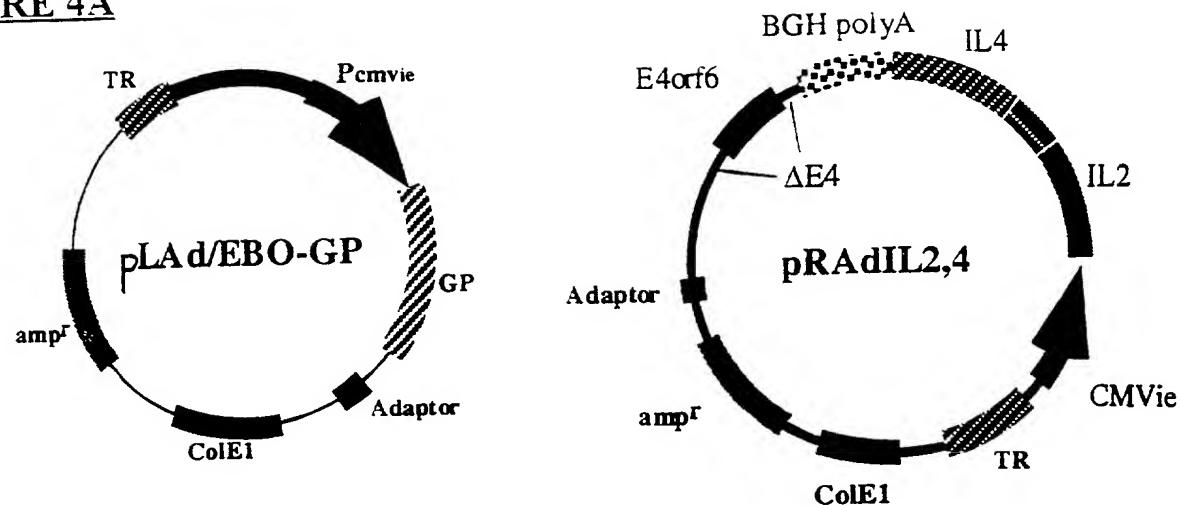


## **FIGURE 2**

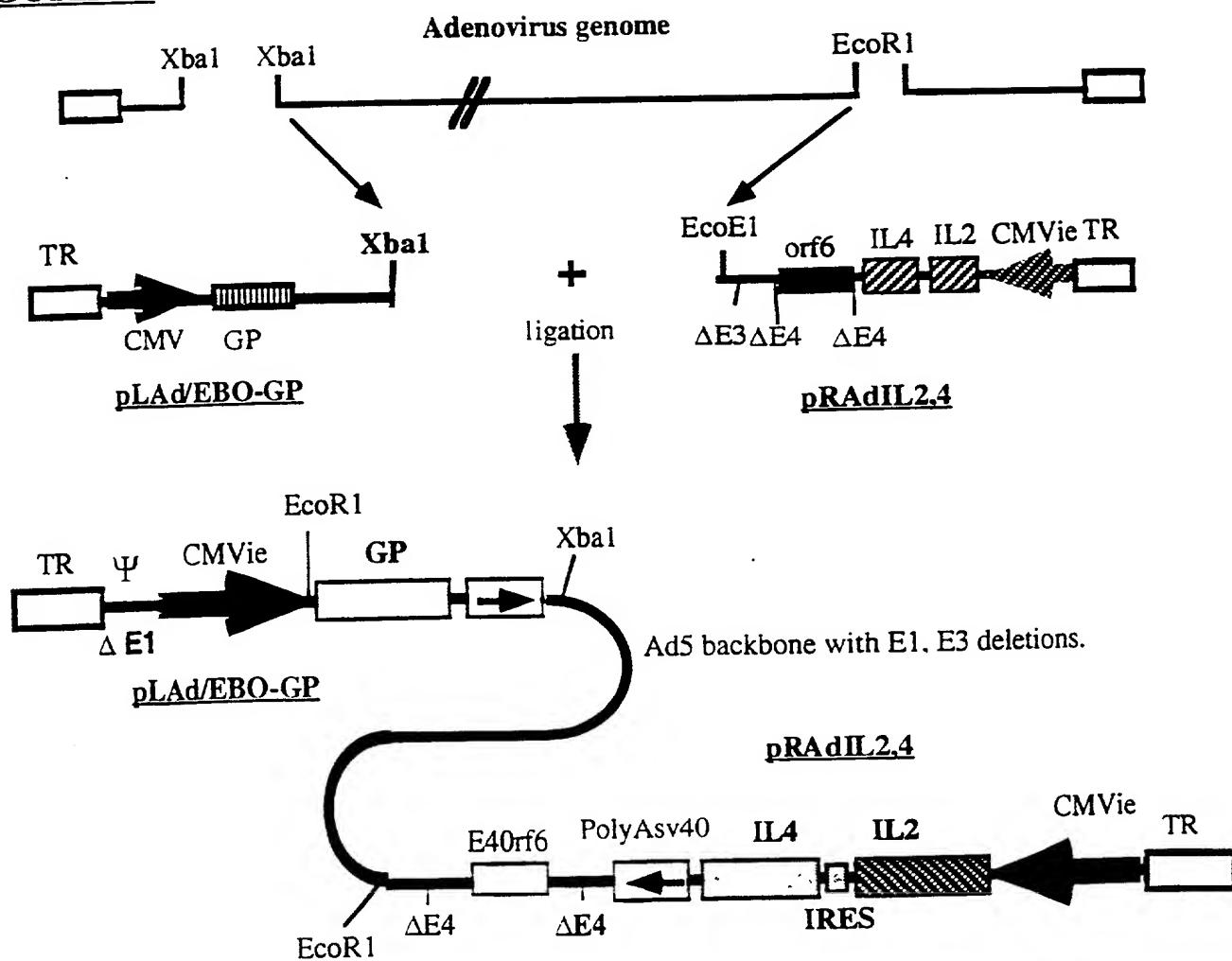




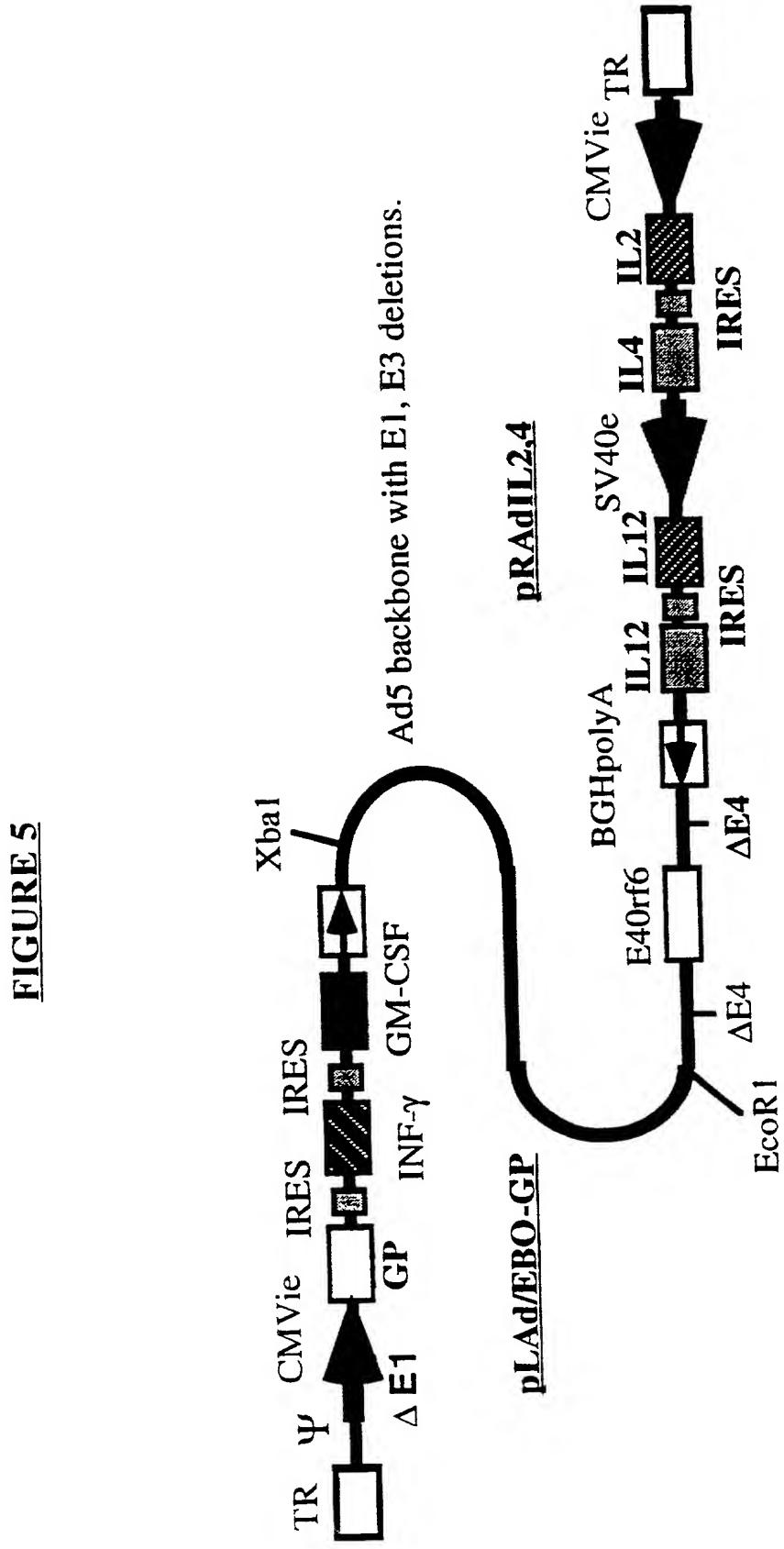
**FIGURE 4A**



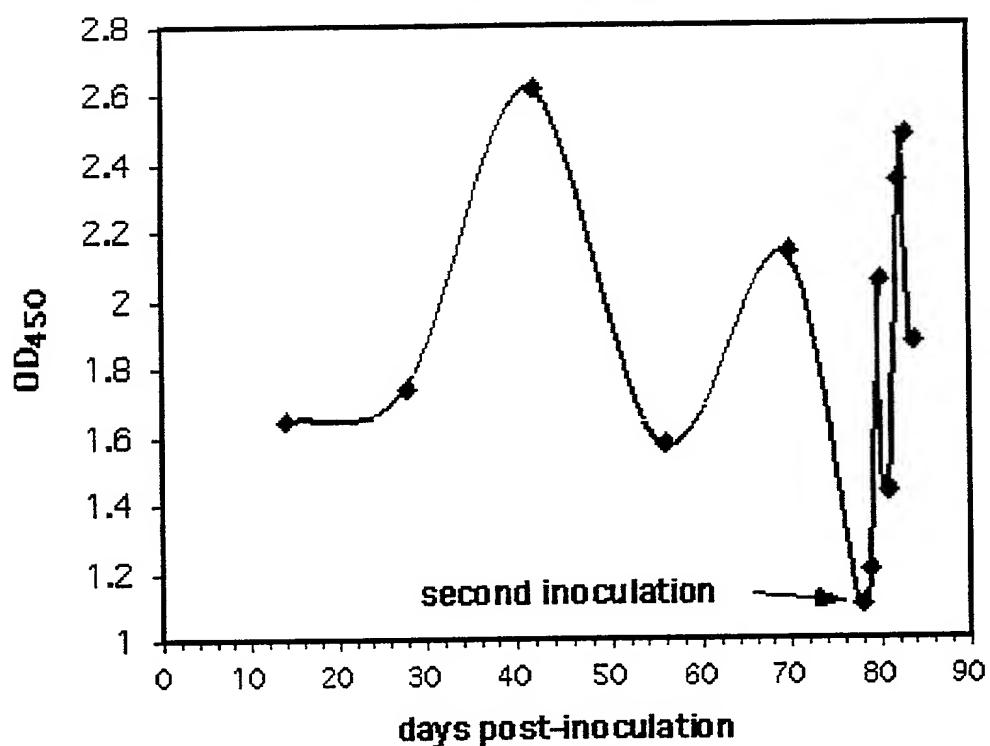
**FIGURE 4B**



**FIGURE 5**

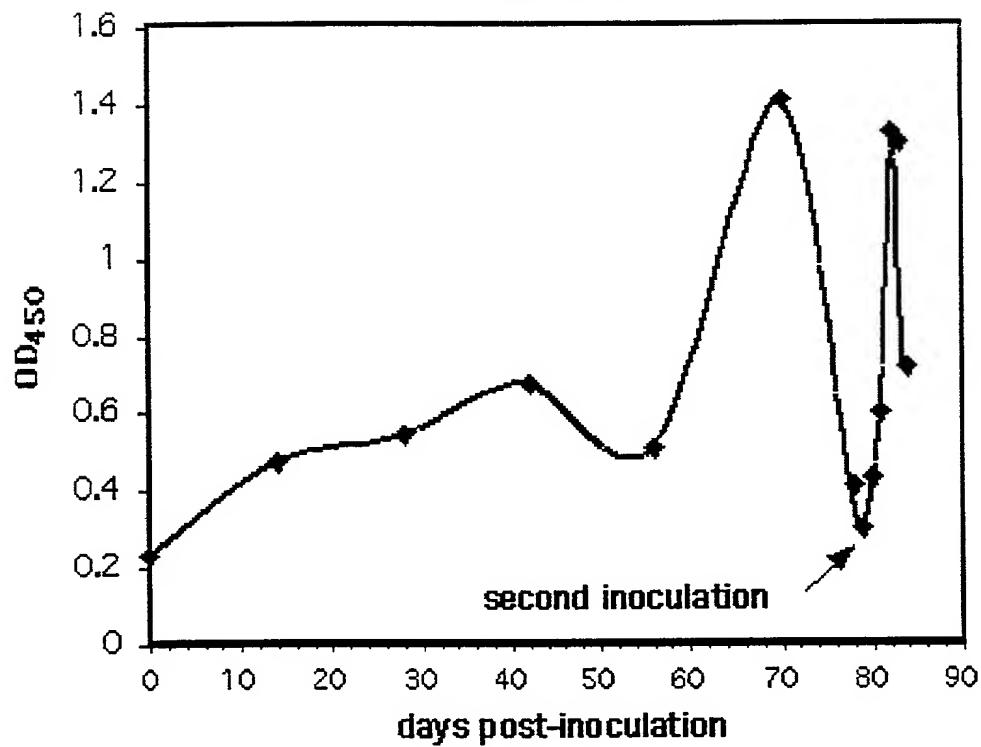


Anti-HIV (tat,env) relative titer  
(Group 3)



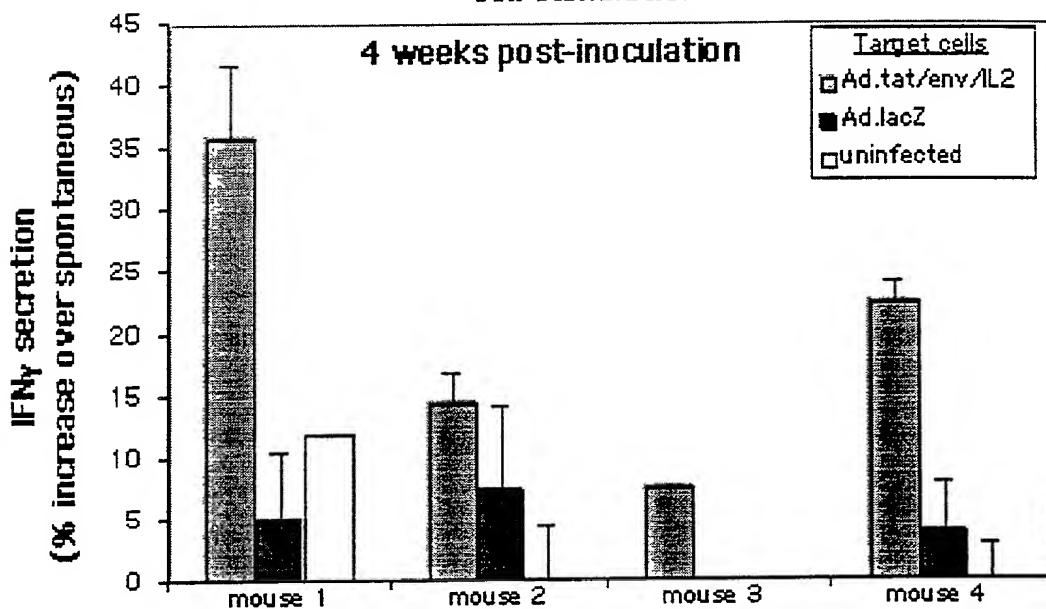
**FIGURE 6**

Anti-HIV (tat,env) relative titer  
(Group 4)



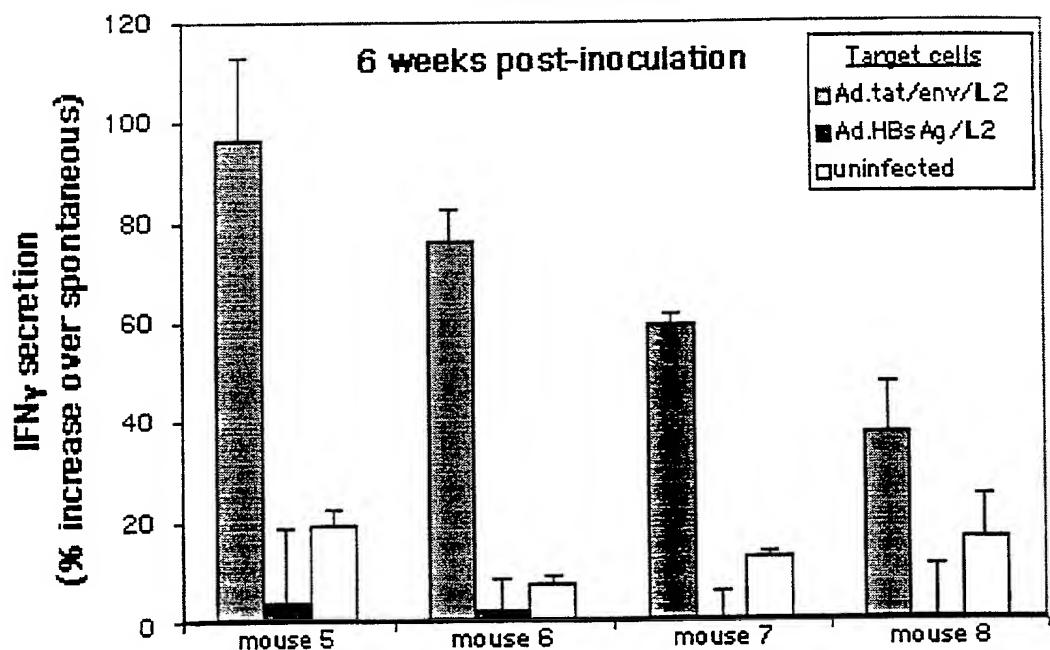
**FIGURE 7**

IFN $\gamma$  secretion from activated splenocytes in response to target cell stimulation



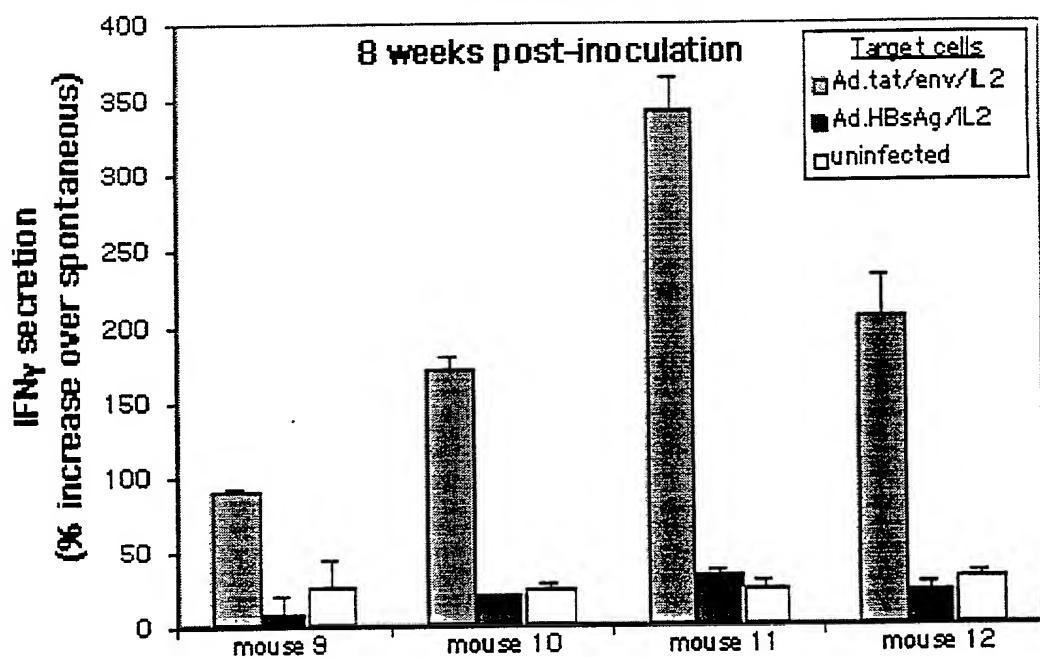
**FIGURE 8A**

IFN $\gamma$  secretion from activated splenocytes in response to target cell stimulation



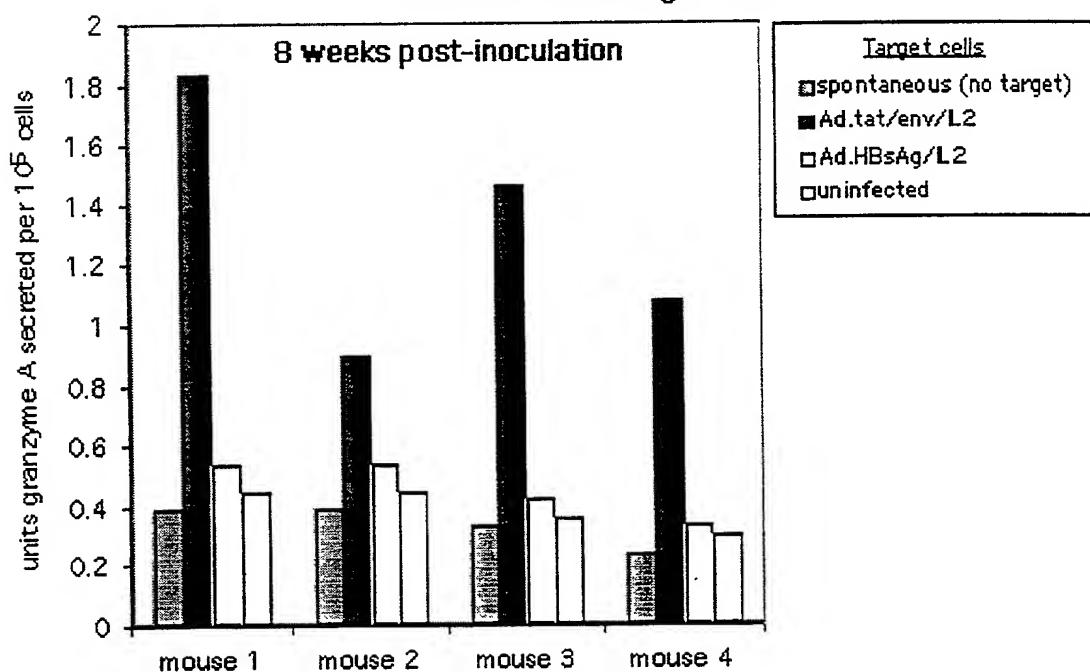
**FIGURE 8B**

IFN $\gamma$  secretion from activated splenocytes in response to target cell stimulation

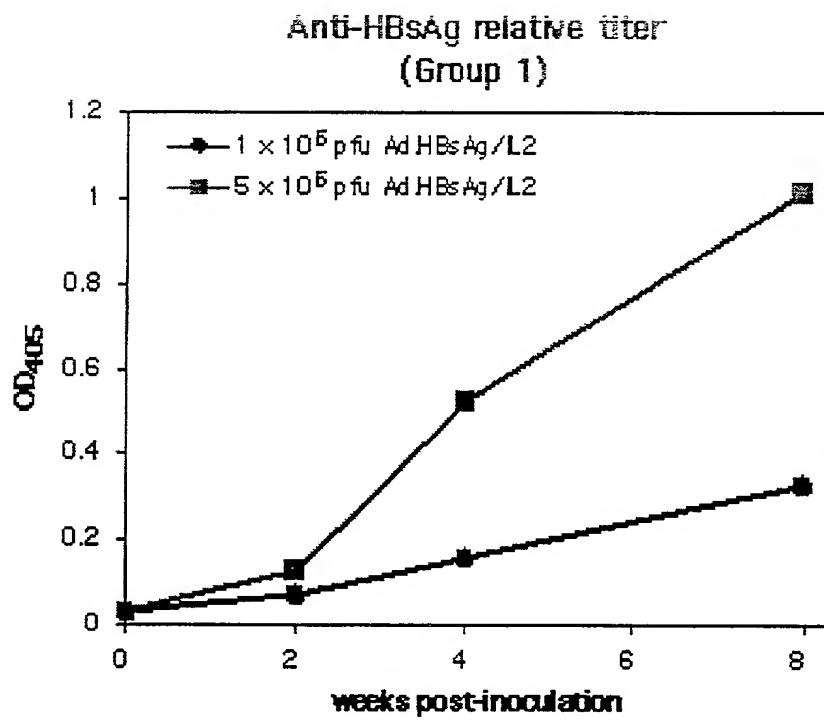


**FIGURE 8C**

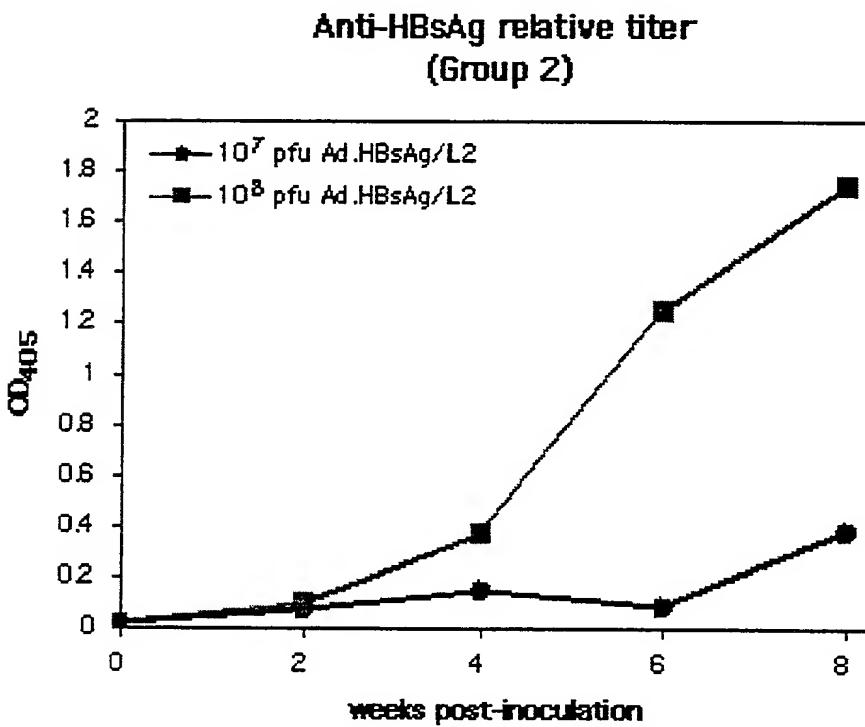
**Granzyme A secretion from activated splenocytes in response to stimulation with target cells**



**FIGURE 9**

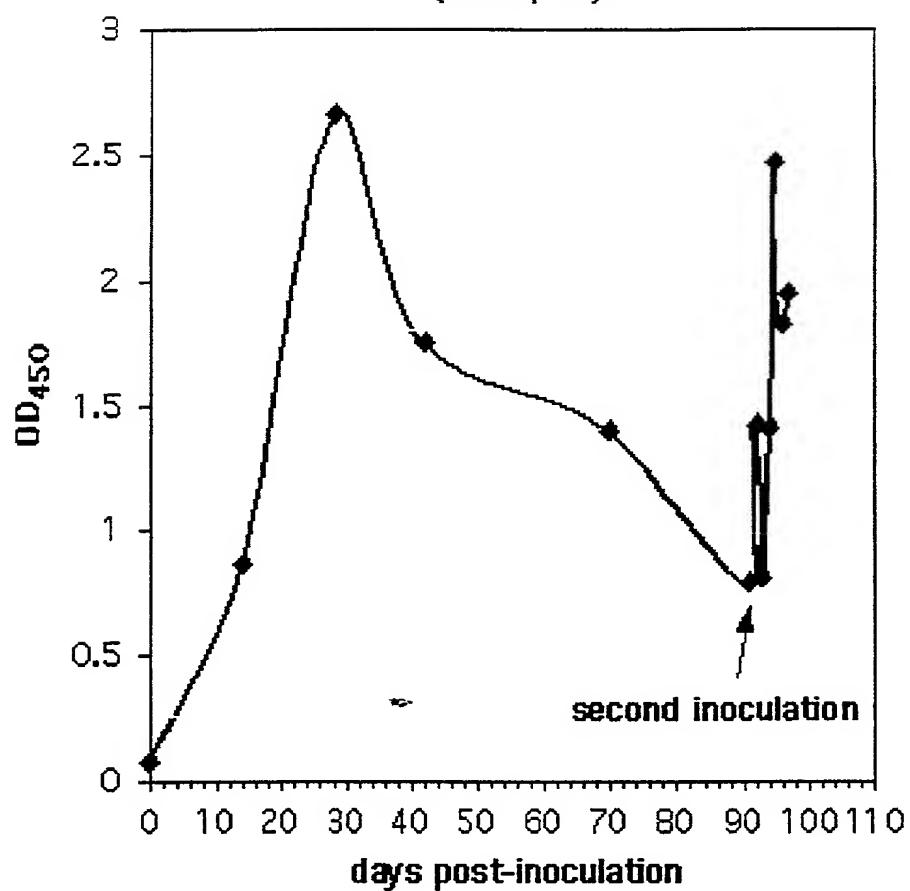


**FIGURE 10A**



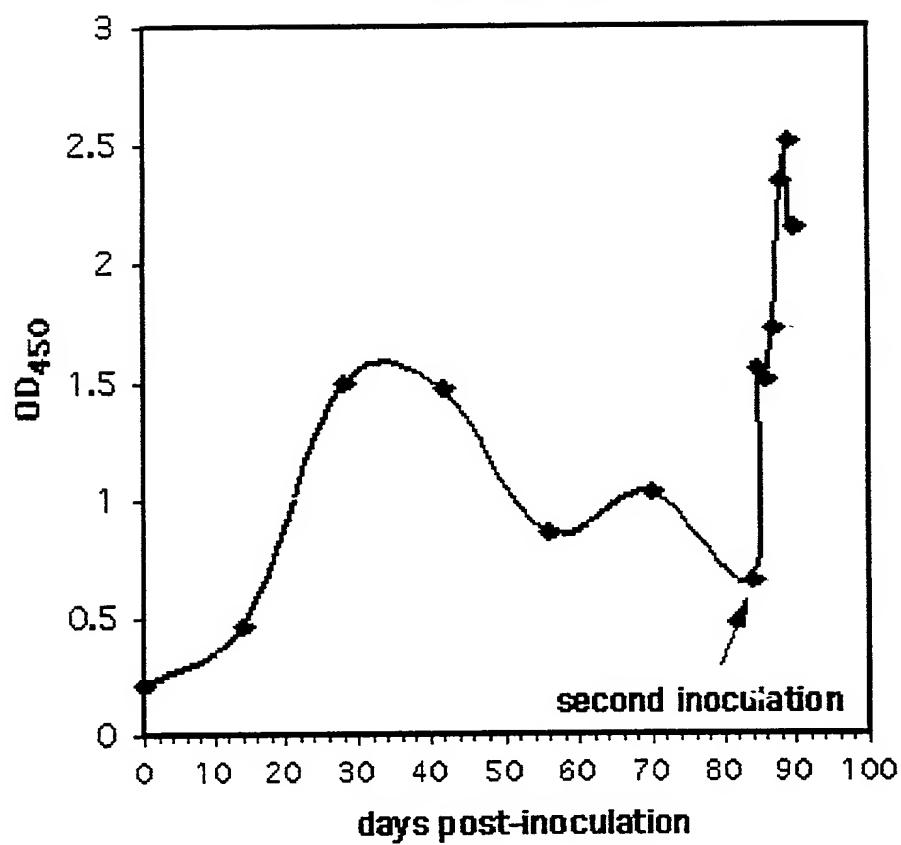
**FIGURE 10B**

Anti-HBcAg relative titer  
(Group 3)



**FIGURE 11A**

Anti-HBcAg relative titer  
(Group 4)



**FIGURE 11B**

**FIGURE 12**

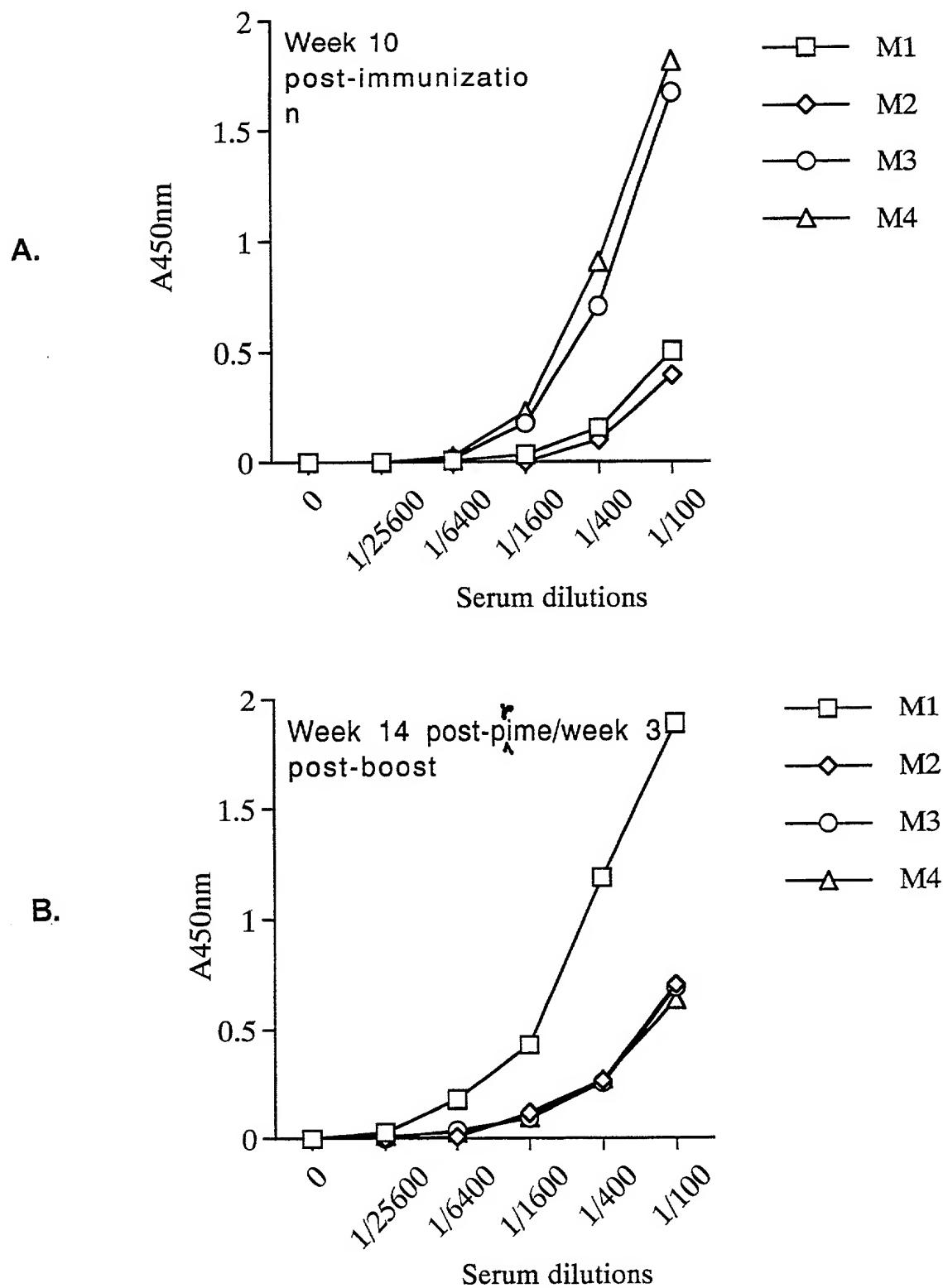
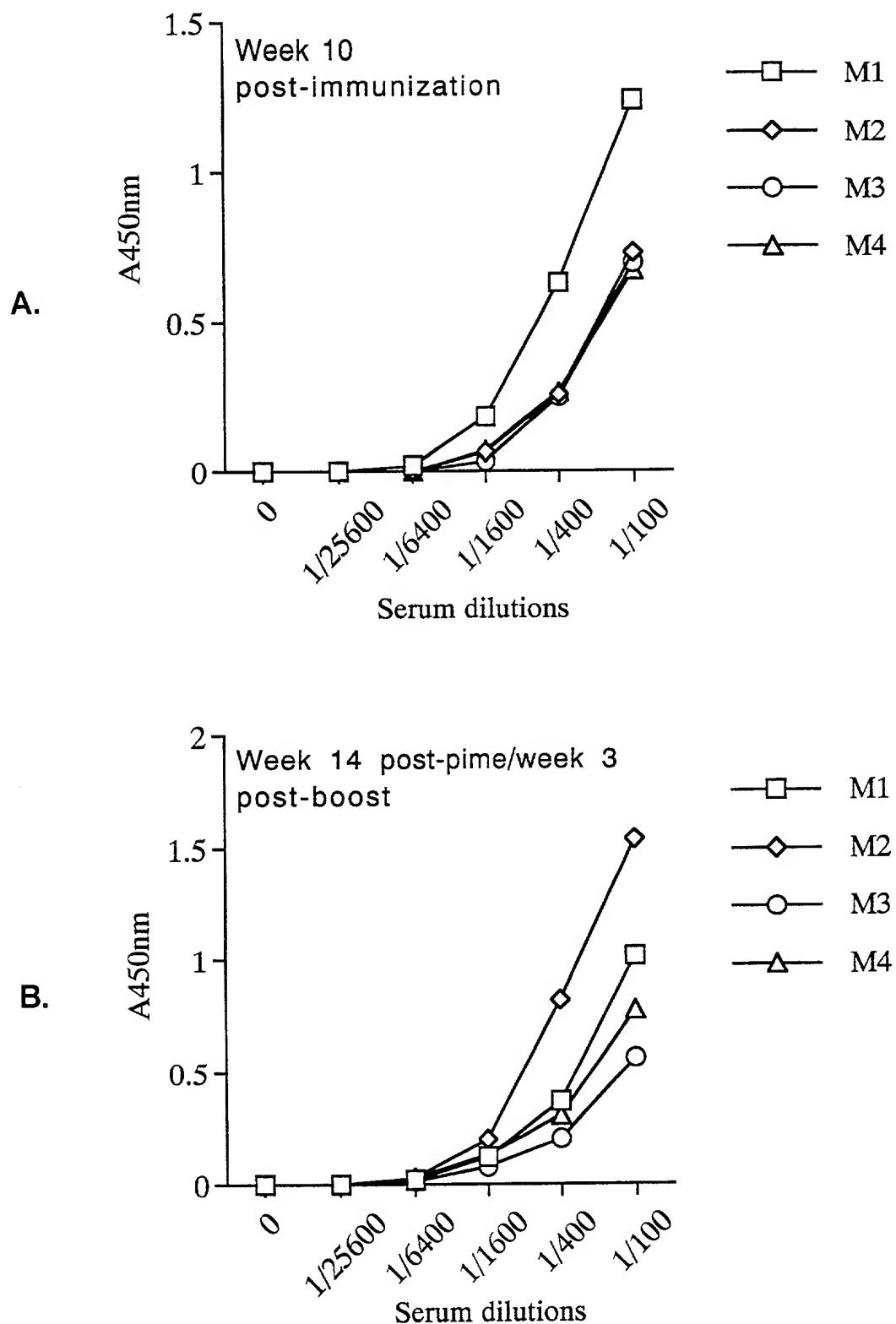
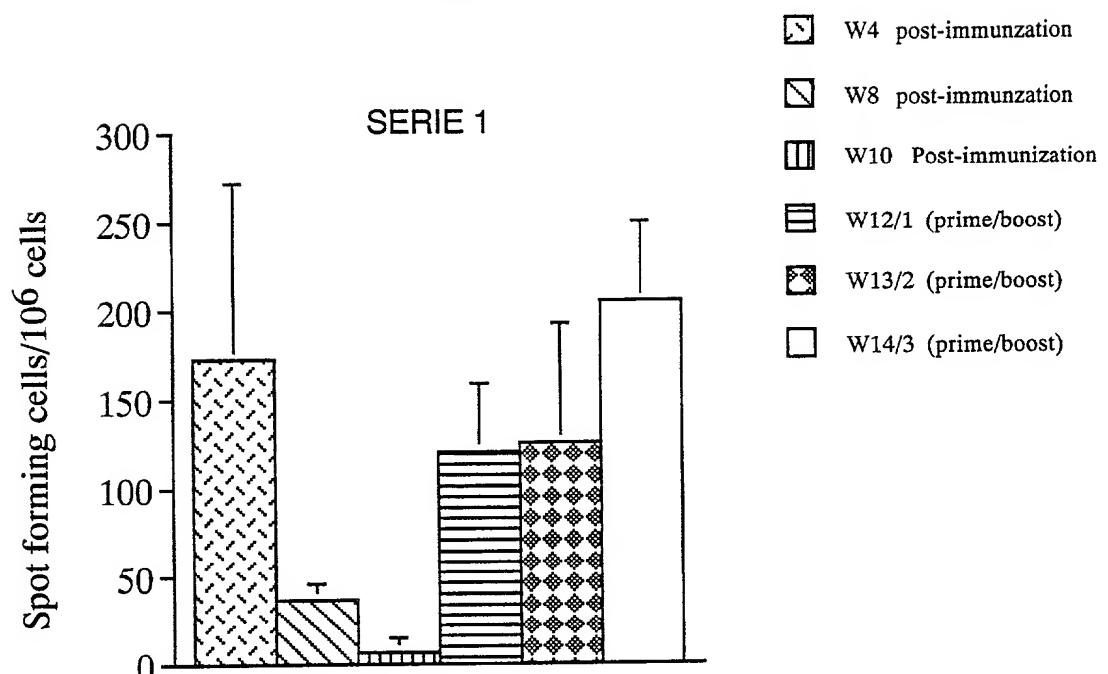
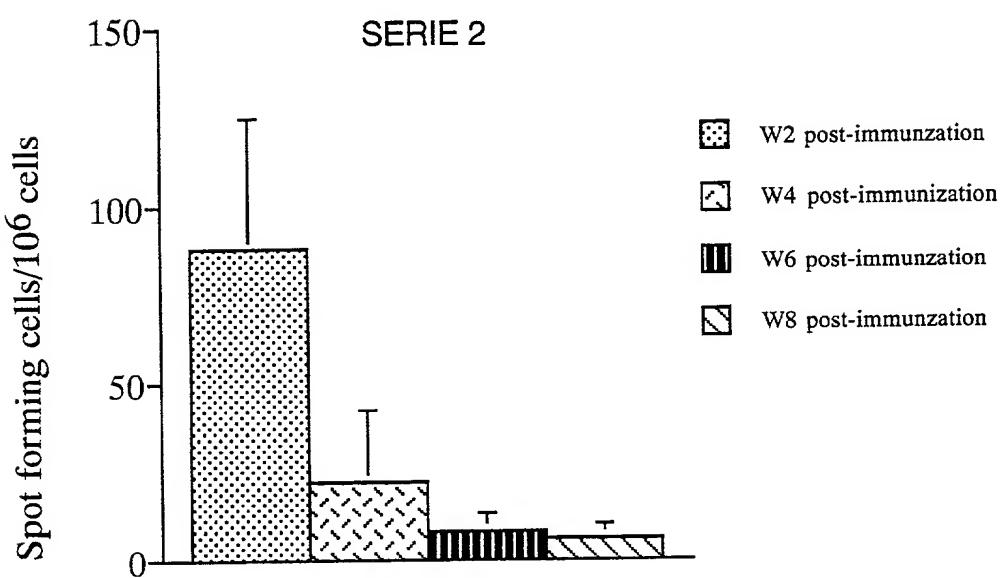


FIGURE 13



**FIGURE 14**

Gag-specific IFN $\gamma$  secreting splenic cells  
after immunization of mice with Ad(3C,  
Gag, Env)

**A.****B.**

**FIGURE 15** L23: ELISPOT for  $\text{IFN}\gamma$  secretion: Serie1 spleen cells from mice at week W13/2 (post-prime/boost)

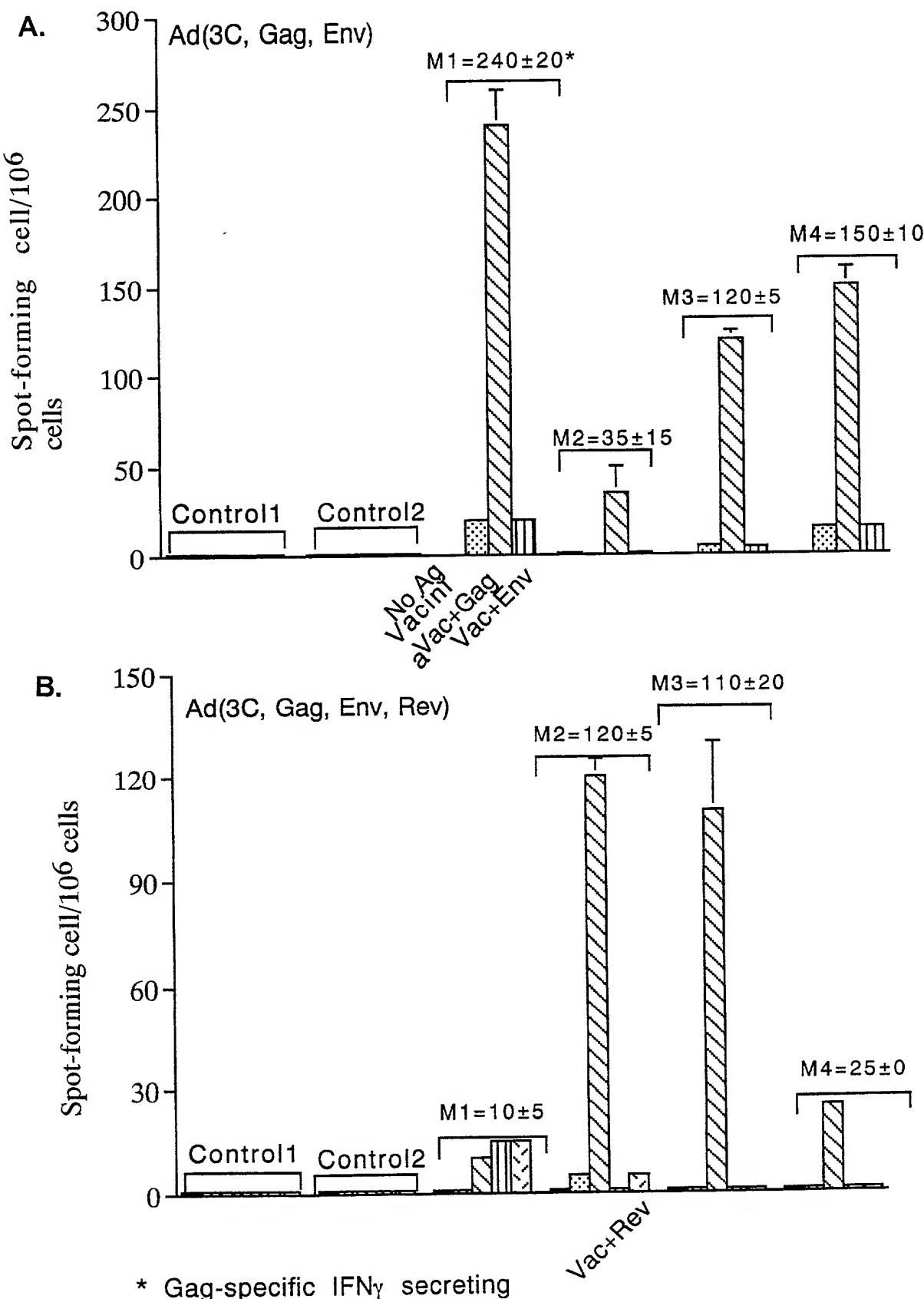
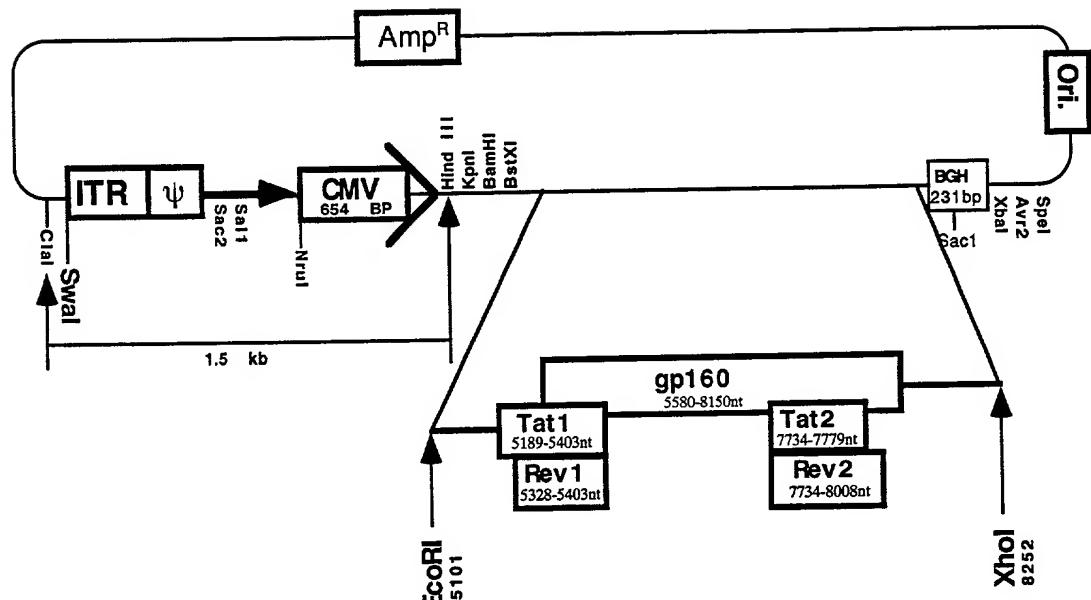
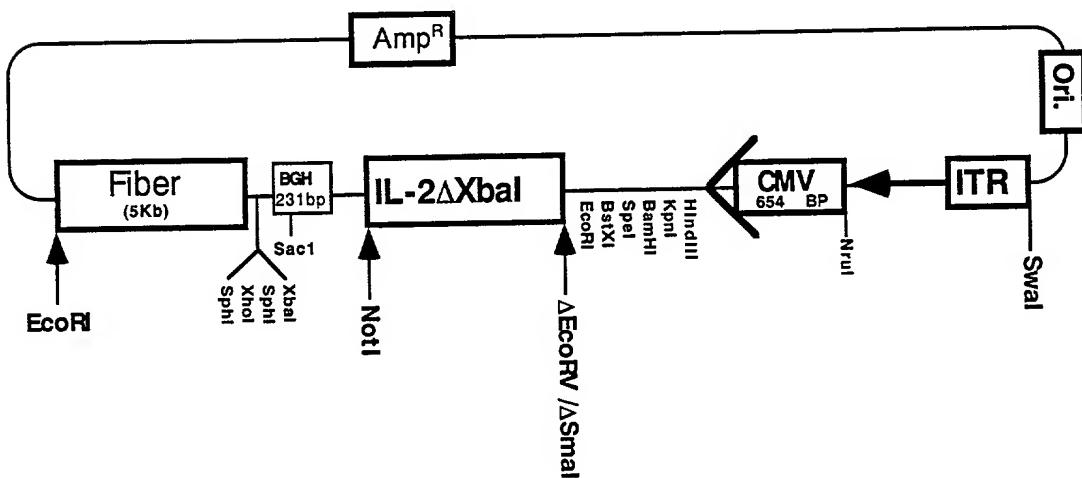


FIGURE 16 Ad-E.T.R/IL2 (from BH10 strain)

A. pLAd-E.T.R

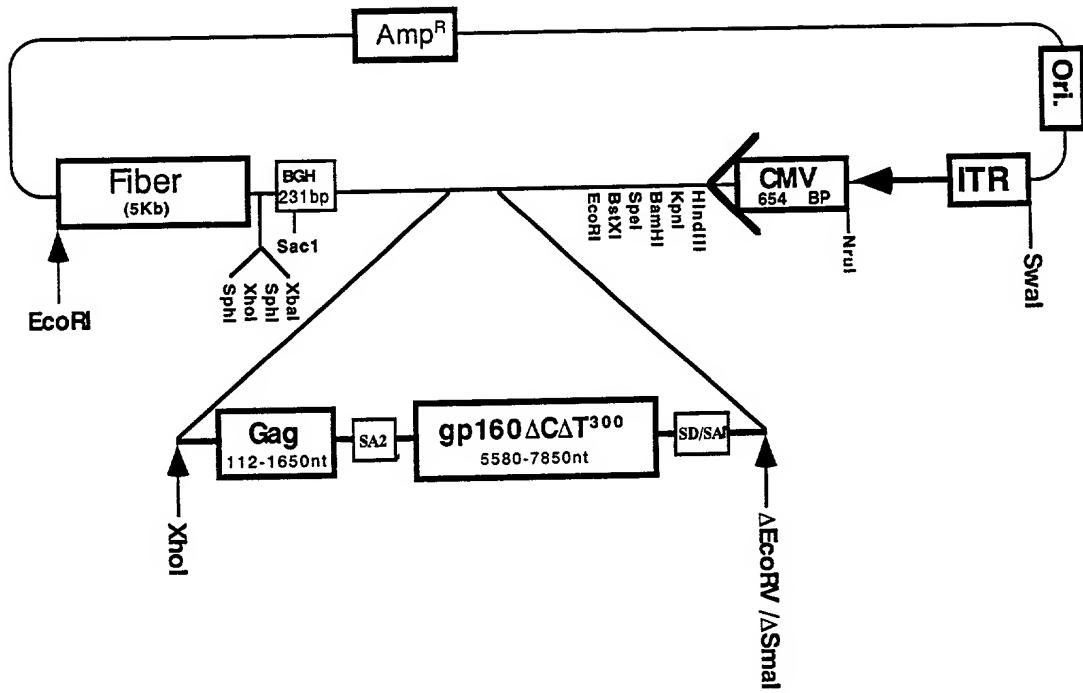


B. pRAd.ORF6-IL2



**FIGURE 17 Ad-3C/E<sup>m</sup>ΔCΔT<sup>300</sup>-G (from BH10 strain)**

**A. pRAd.ORF6-E<sup>m</sup>ΔCΔT<sup>300</sup>-G**



**B. pLAd-3C**

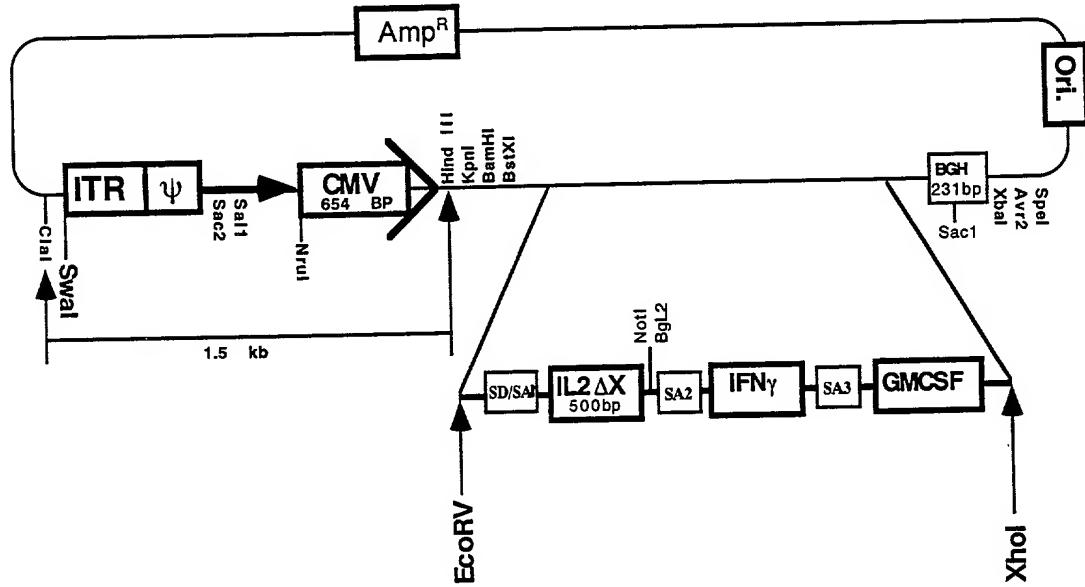


FIGURE 18

pRAd.ORF6-E<sup>m</sup>ΔCAT<sup>99</sup>.T.R-G

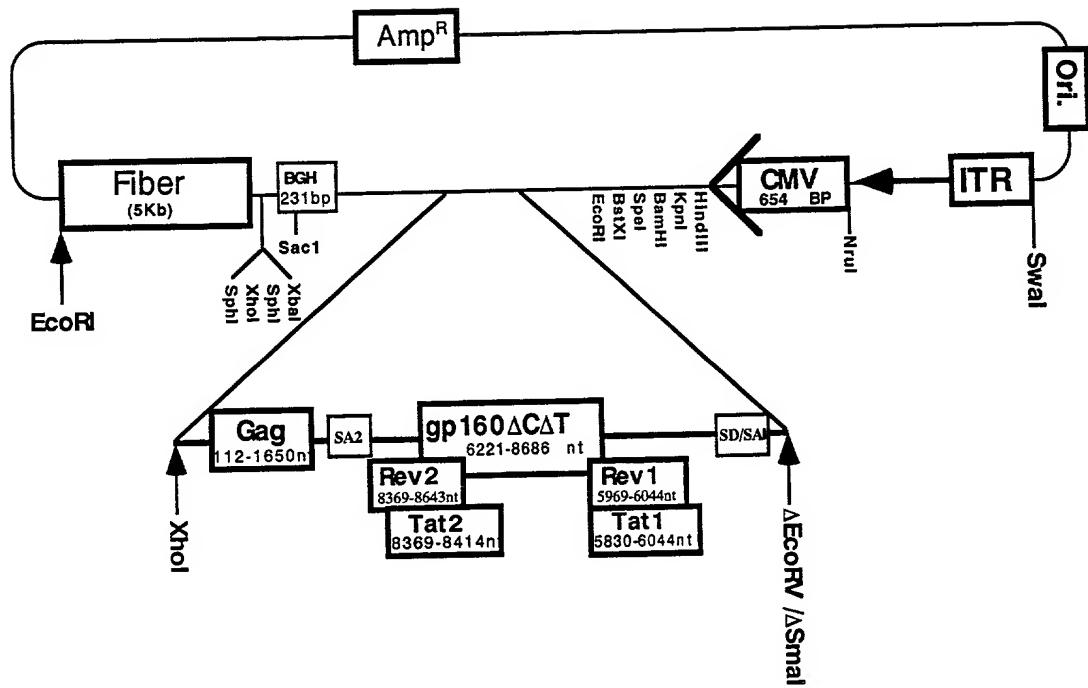
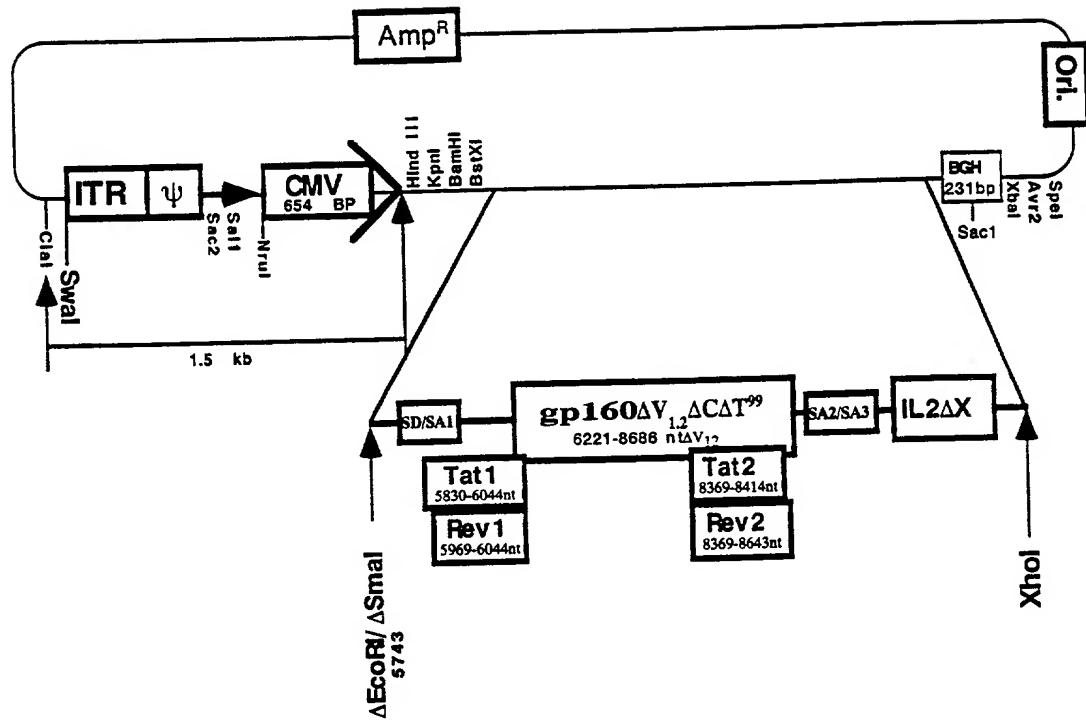


FIGURE 19

A. pLAd-E<sup>m</sup>ΔV<sub>1,2</sub>ΔCAT.T.R-IL2



B. pRAd.ORF6-G.IL2

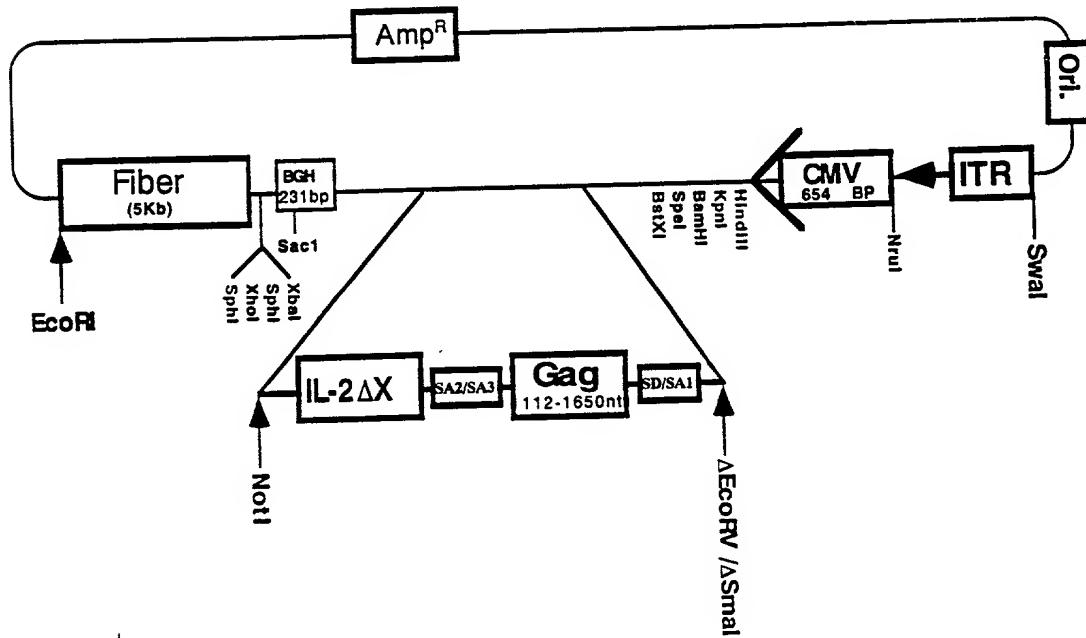
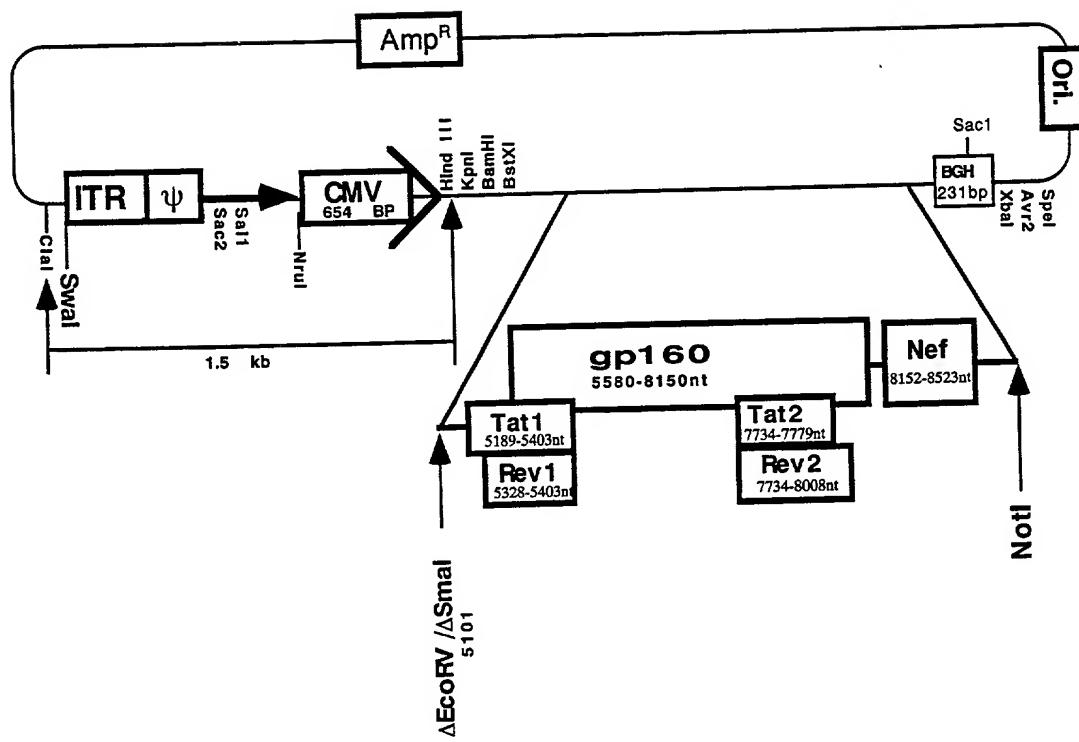


FIGURE 20

pLAd-ETRN



**FIGURE 21**

pLAd-E<sup>m</sup>ΔC.N

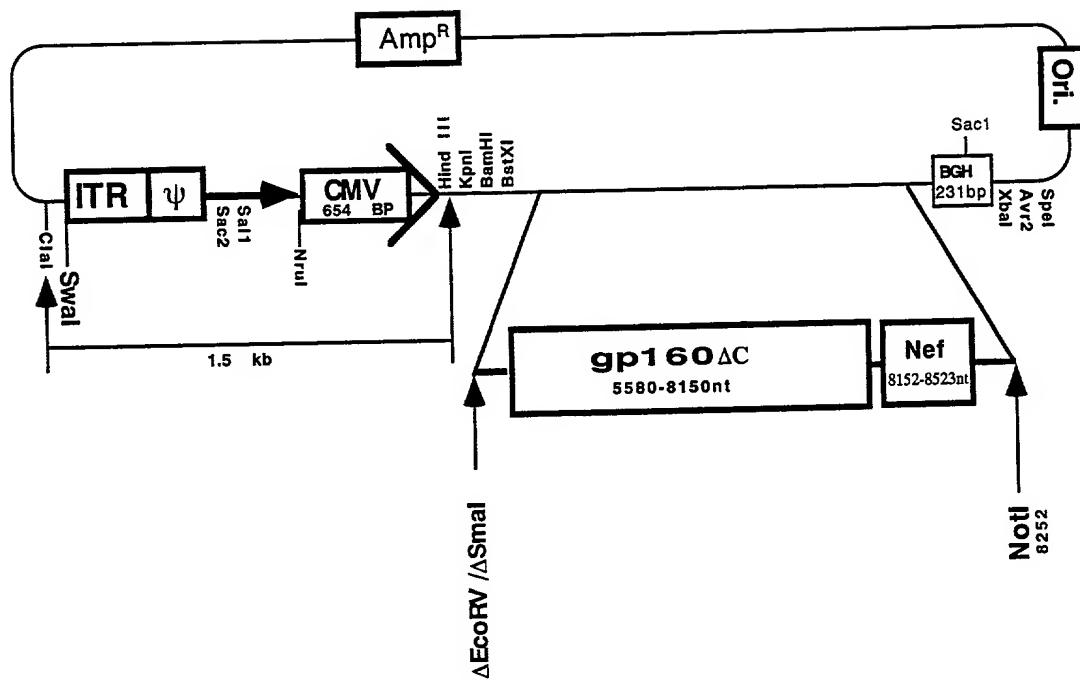


FIGURE 22

pLAd-E<sup>m</sup>ΔCΔT<sup>300</sup>.T

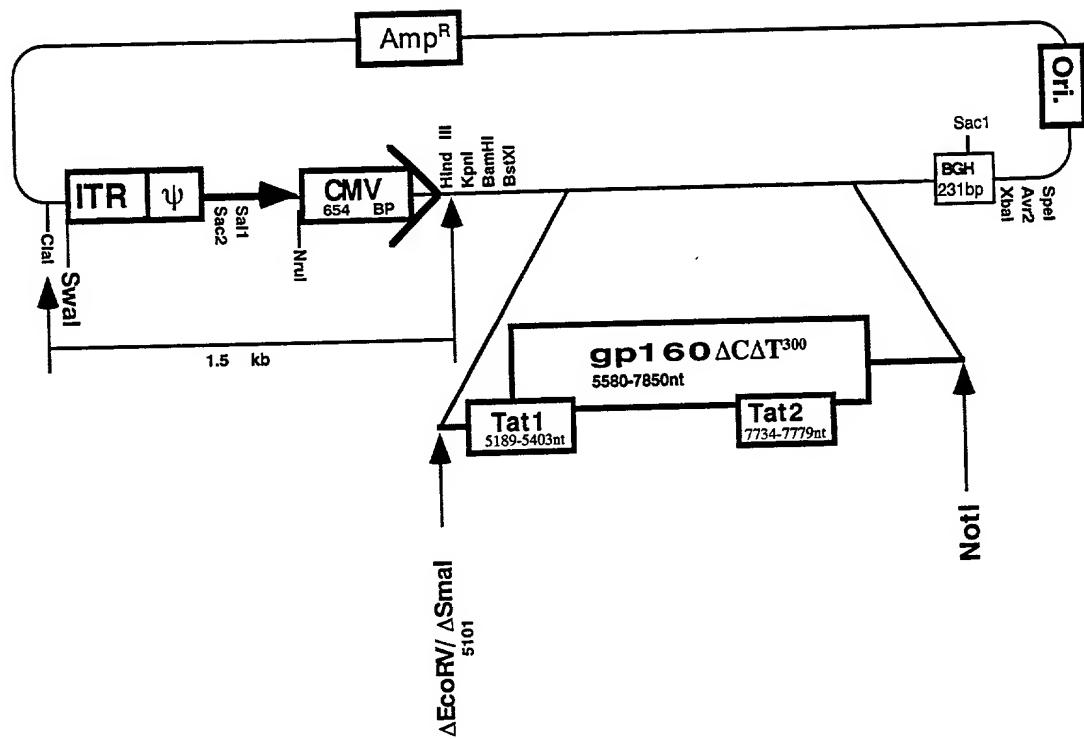
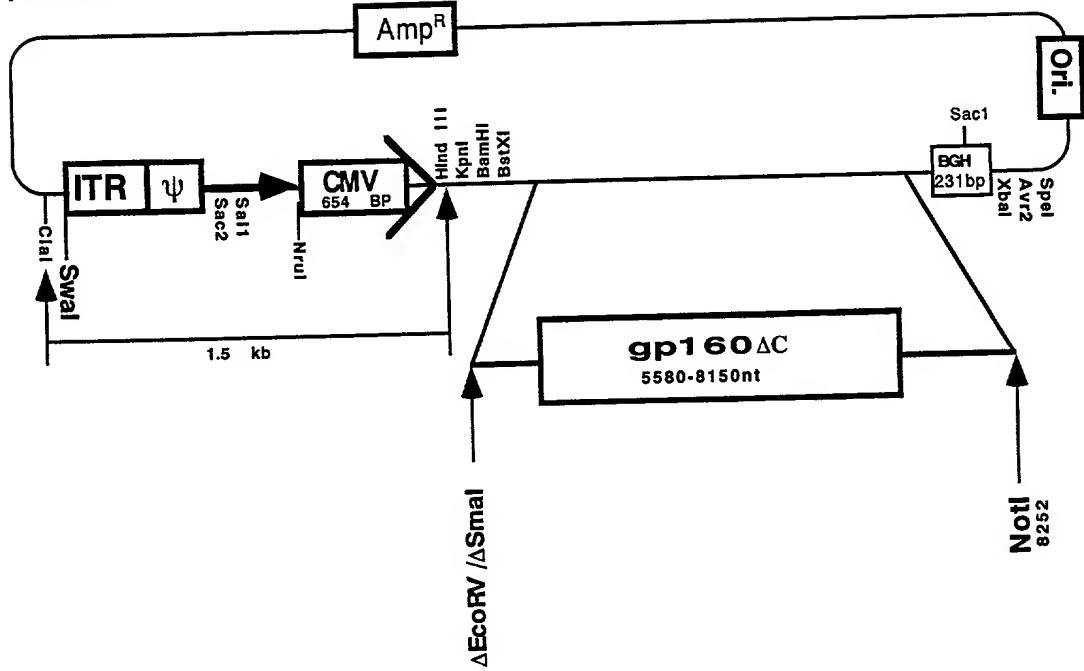
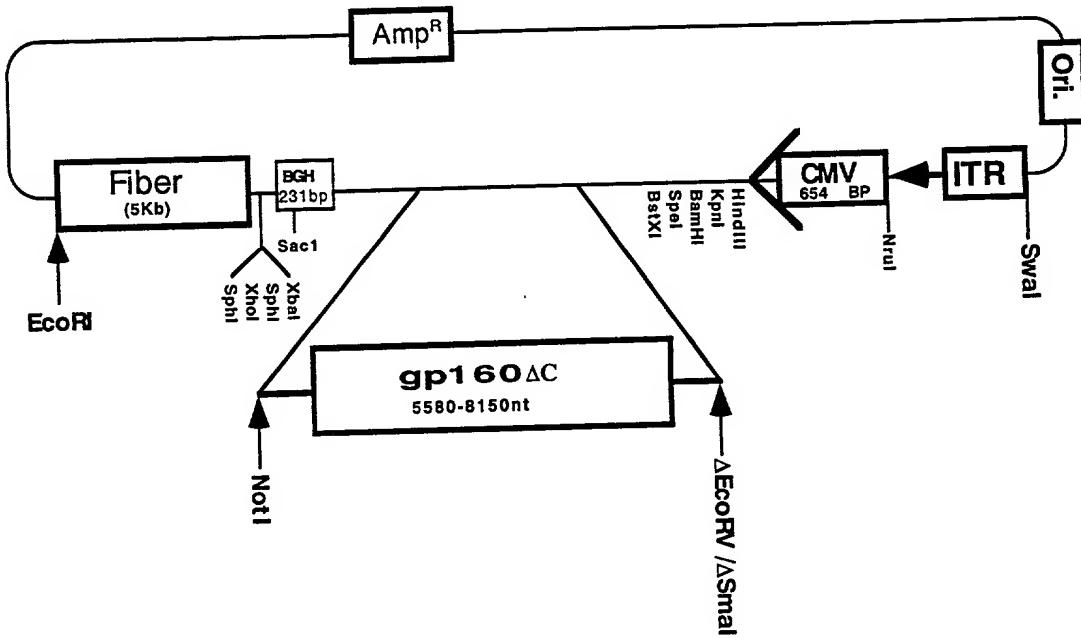


FIGURE 23

A. pLAd-E<sup>m</sup>ΔC

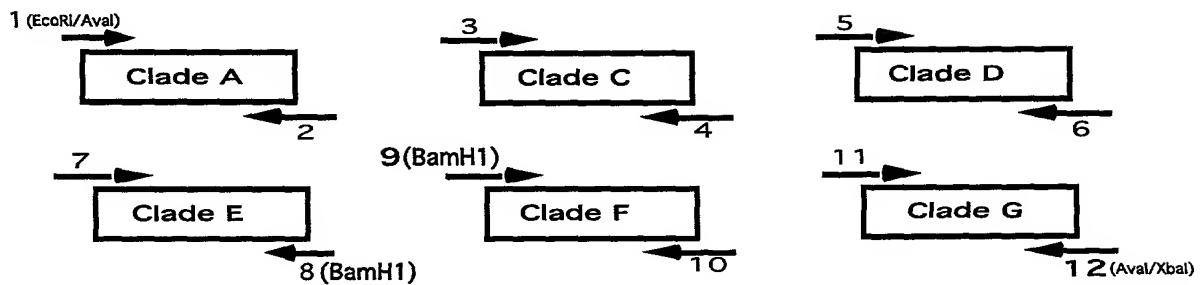


B. pRAd.ORF6-E<sup>m</sup>ΔC

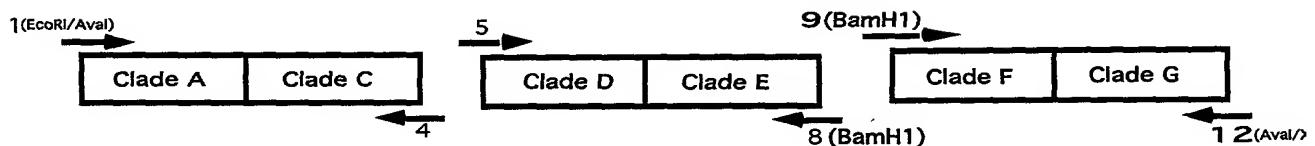


# FIGURE 24

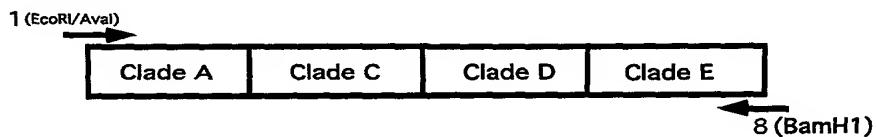
## Step 1. Amplification of each individual clade A-G



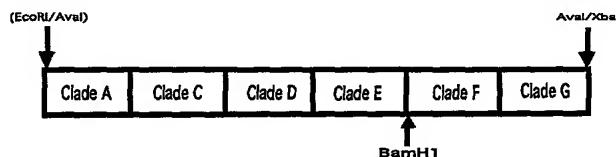
## Step 2. Amplification of every two Clades AC, DE, FG



## Step 3. Amplification of Clades ACDE



## Step 4. Cloning the multi-clades into pSP73 vector



## Step 5. Generating of a duplicated multi-clades

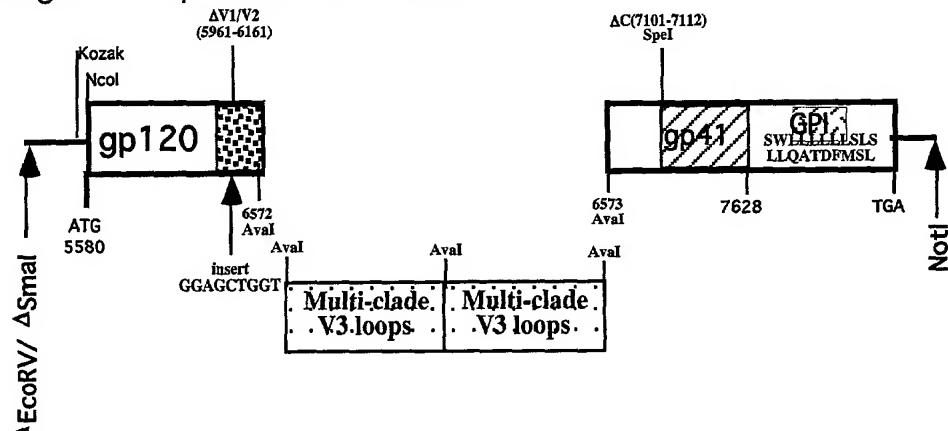
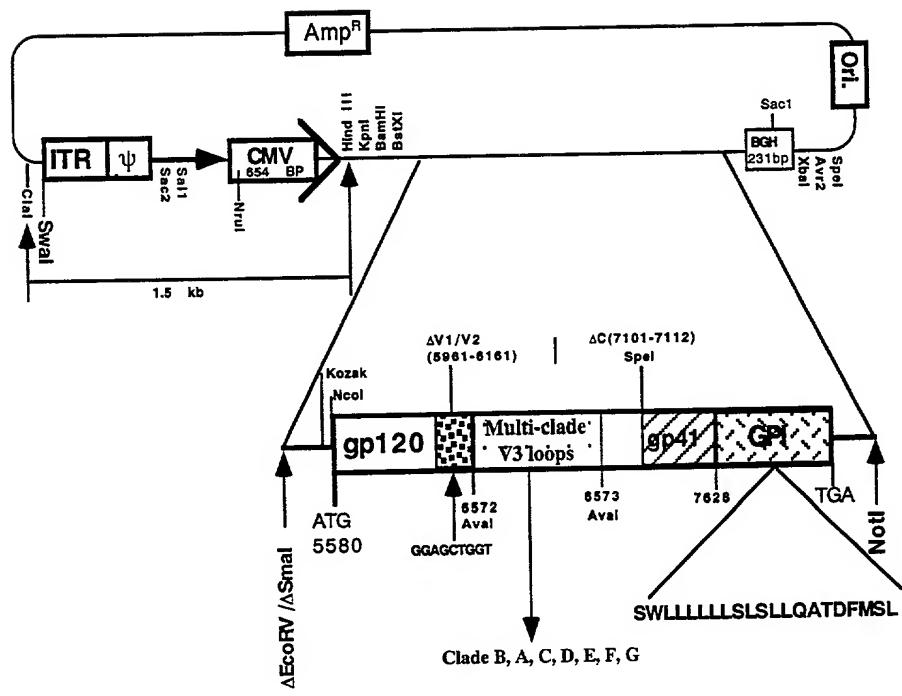


FIGURE 25

pLAd-E<sup>m</sup>.V3



## FIGURE 26

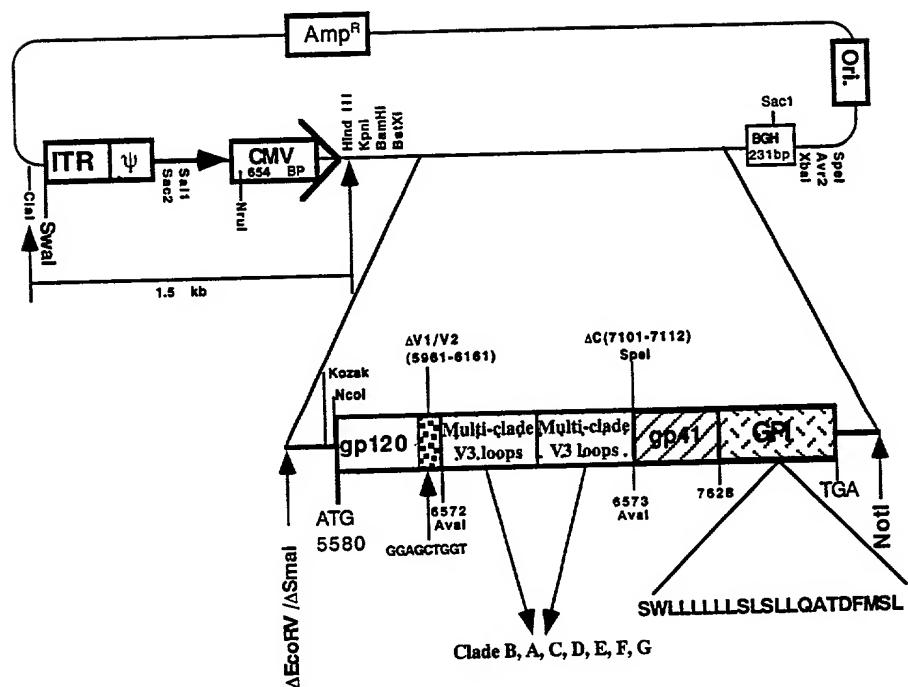
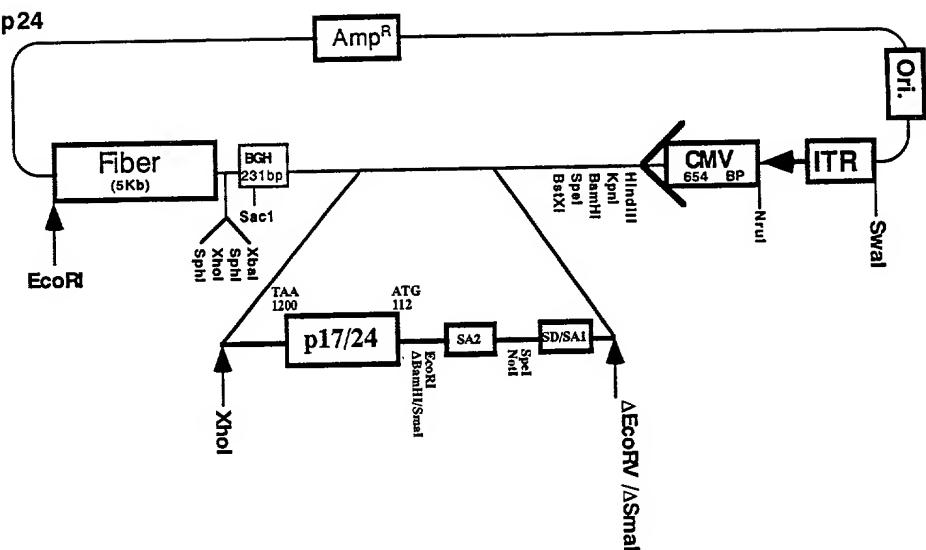
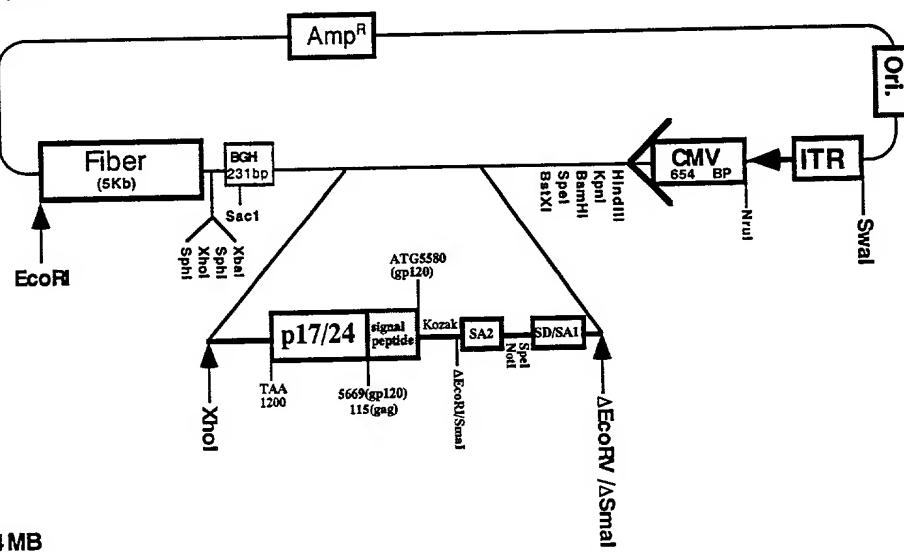


FIGURE 27

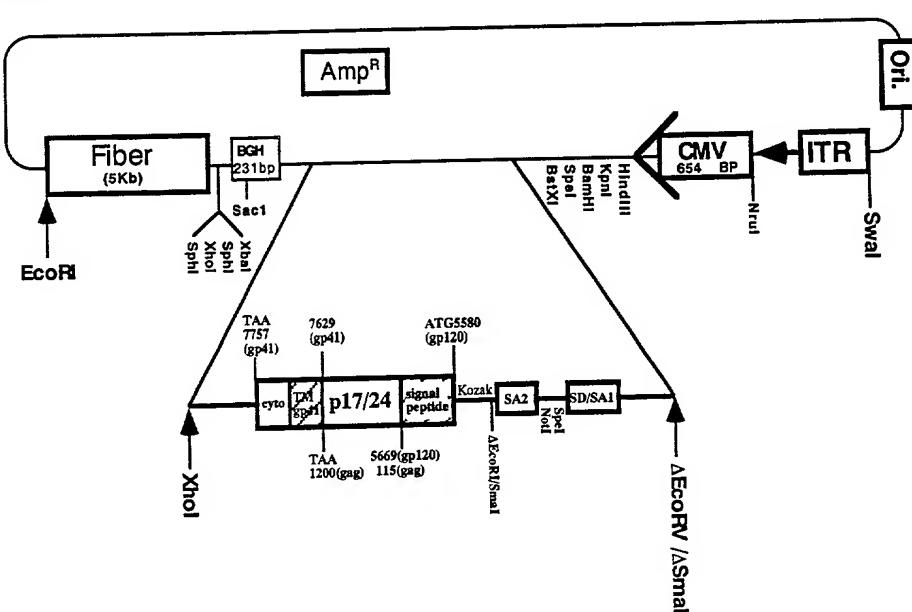
A. pRAd.ORF6-p17/ p24



B. pRAd.ORF6-p17/ 24sec



C. pRAd.ORF6-p17/ 24MB



## FIGURE 28

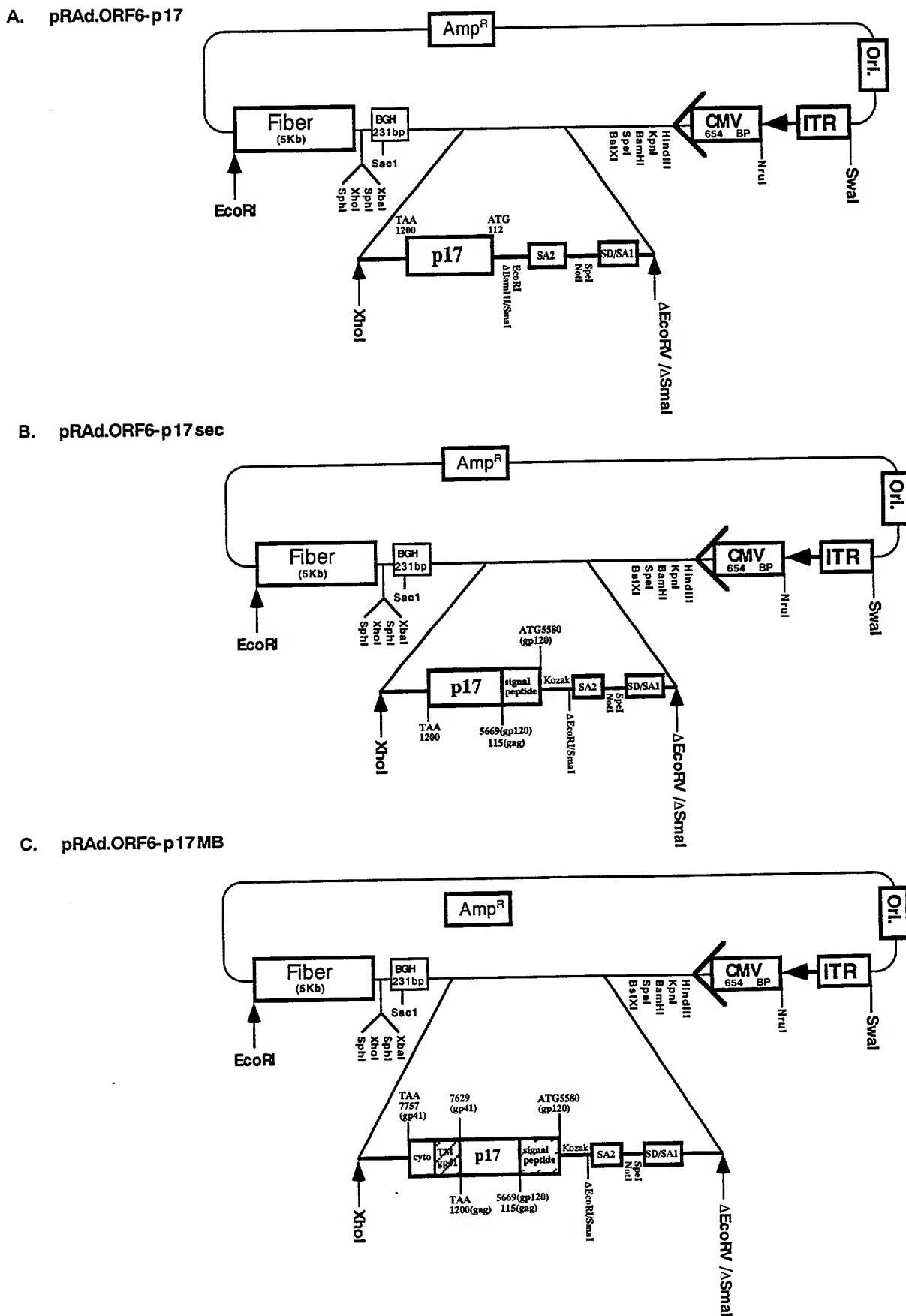
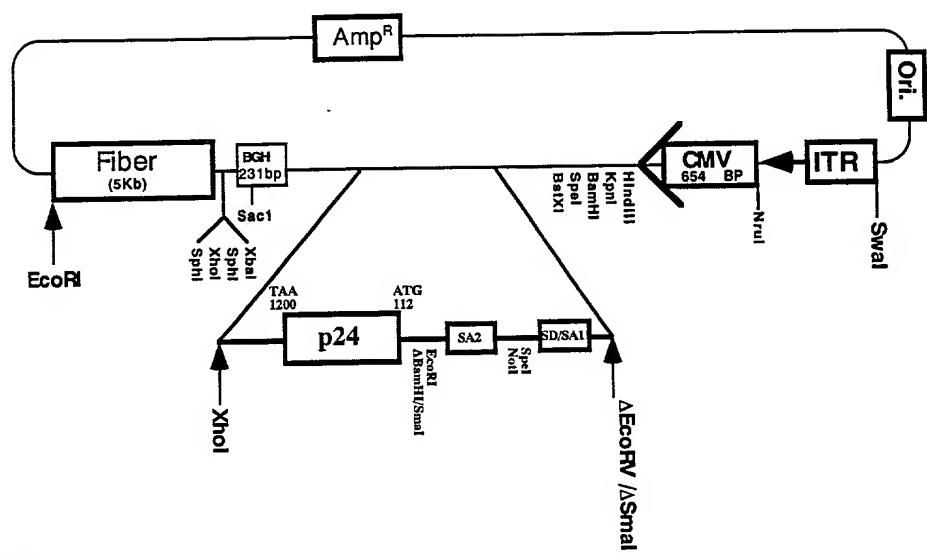
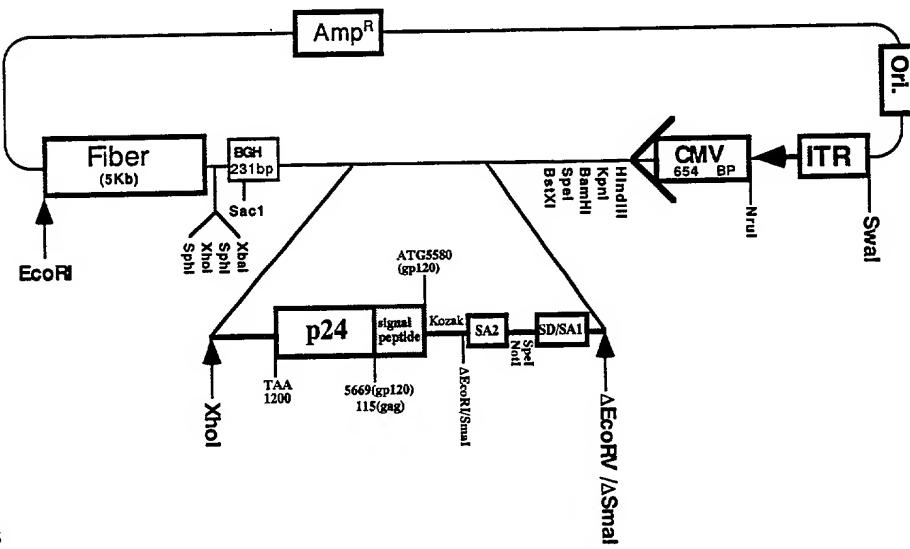


FIGURE 29

A. pRAd.ORF6-p24



B. pRAd.ORF6-p24 sec



C. pRAd.ORF6-p24 MB

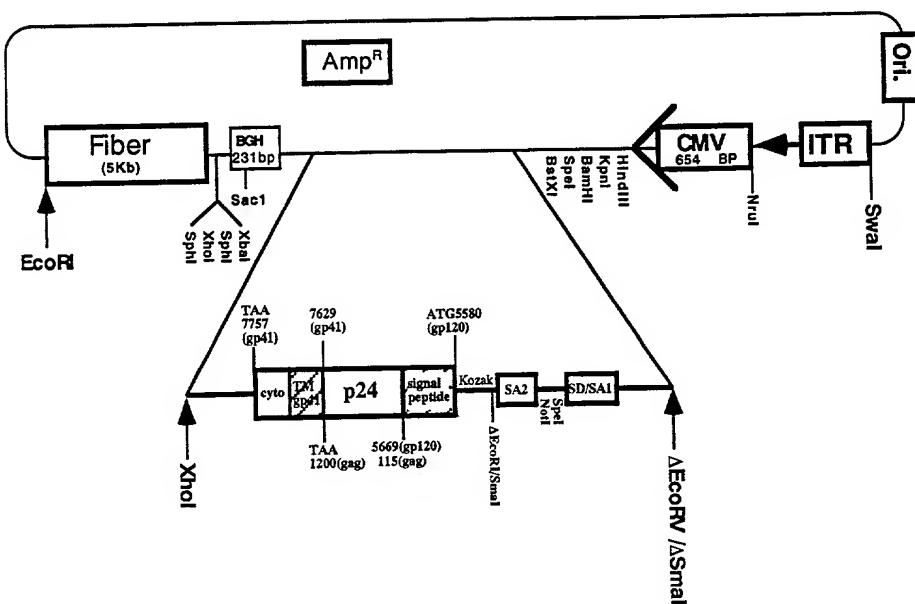
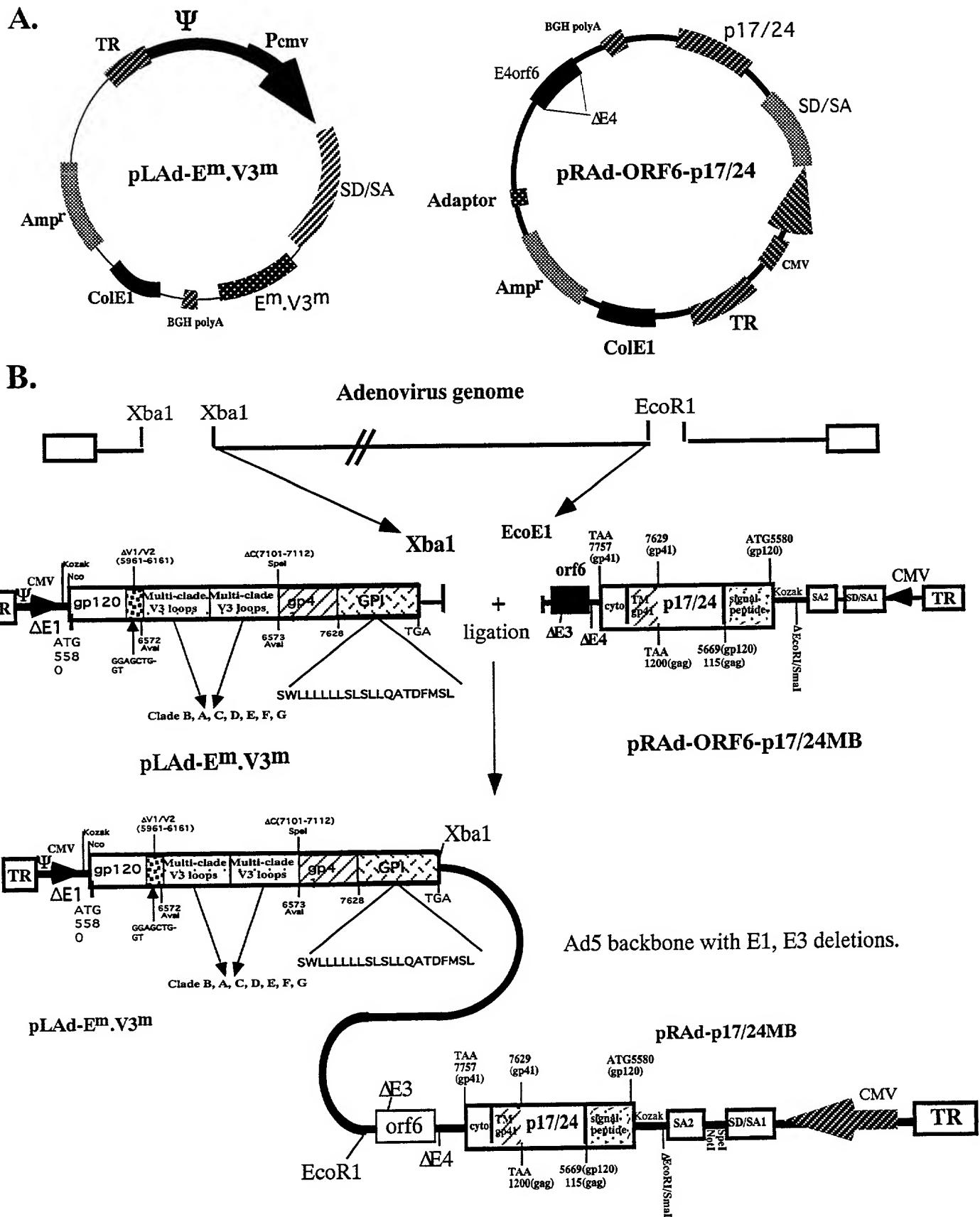
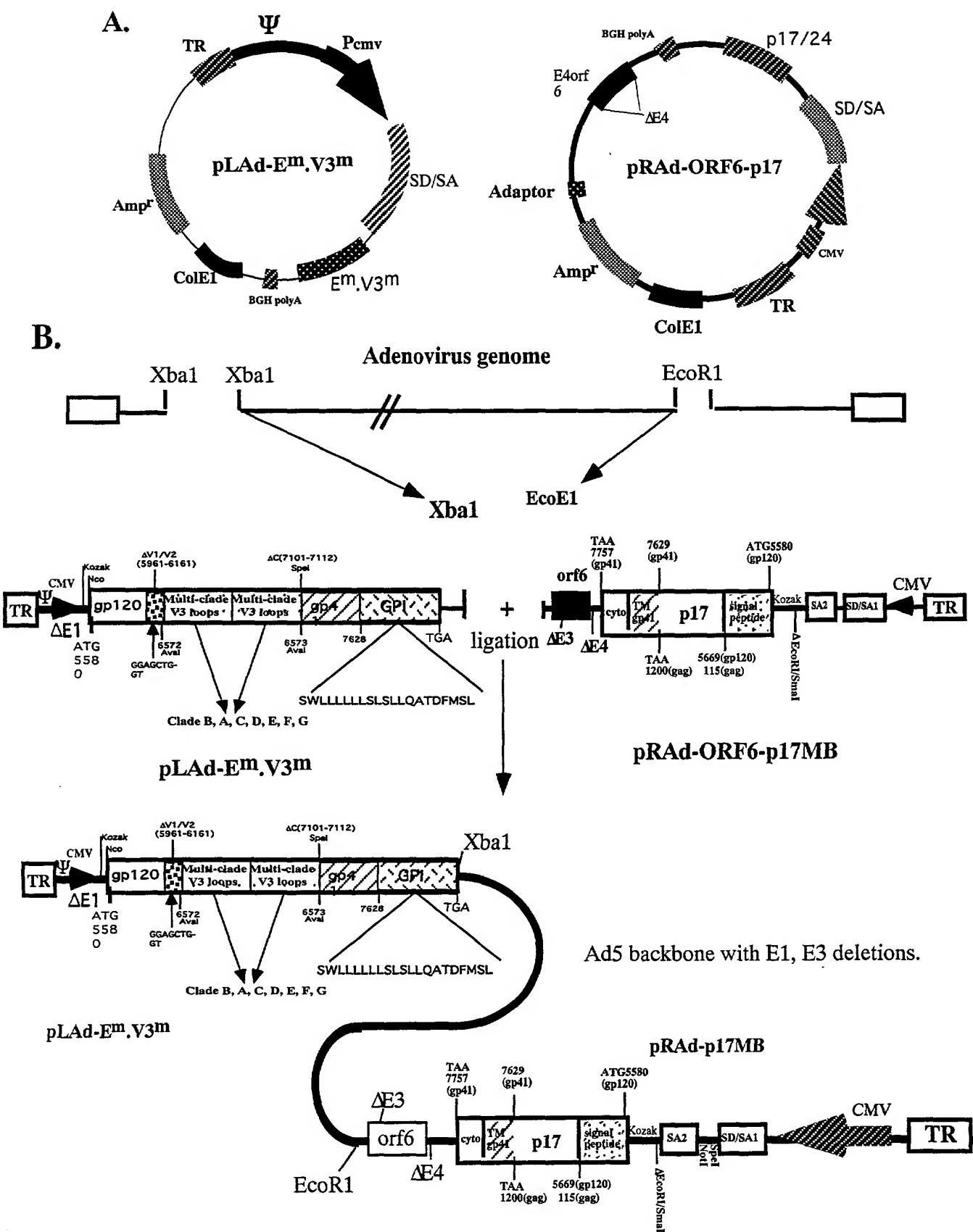


FIGURE 30 Adenoviral construct of Ad-E<sup>m</sup>.V3<sup>m</sup>/p17/24MB



**FIGURE 31** Adenoviral construct of Ad-E<sup>m</sup>.V3m/p17MB



**FIGURE 32** Adenoviral construct of Ad-E<sup>m</sup>.V3<sup>m</sup>/p24MB

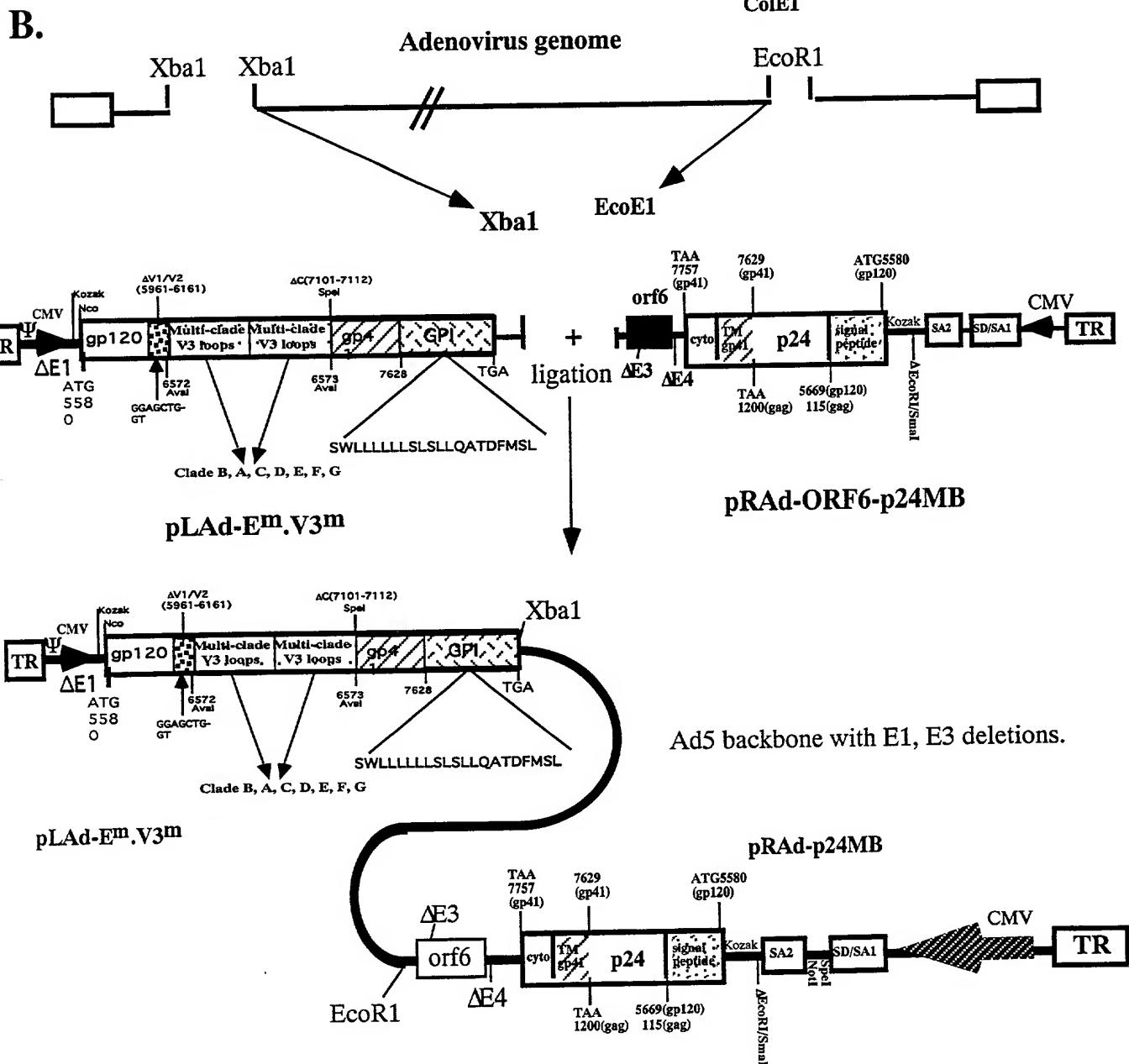
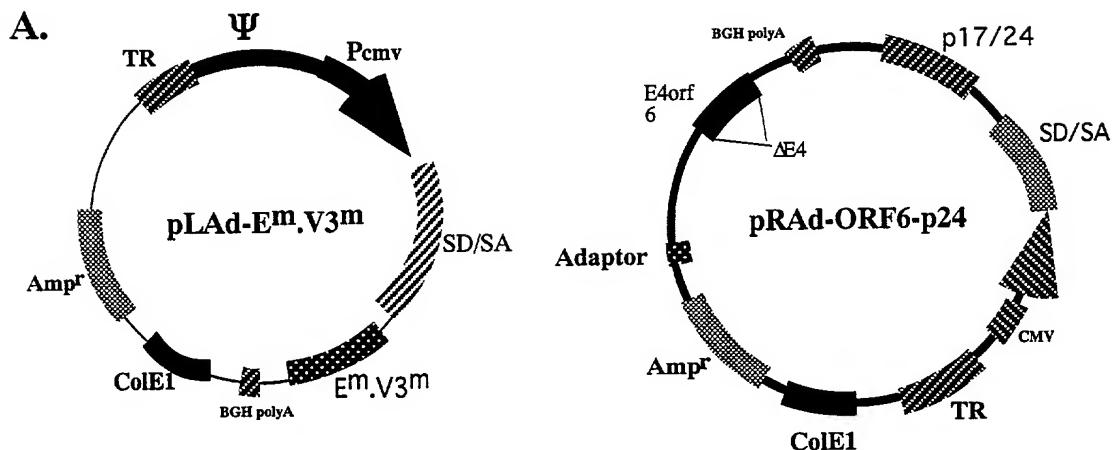


FIGURE 33

pLAd-E<sup>m</sup>ΔCΔT<sup>300</sup>.V3<sup>m</sup>.T.

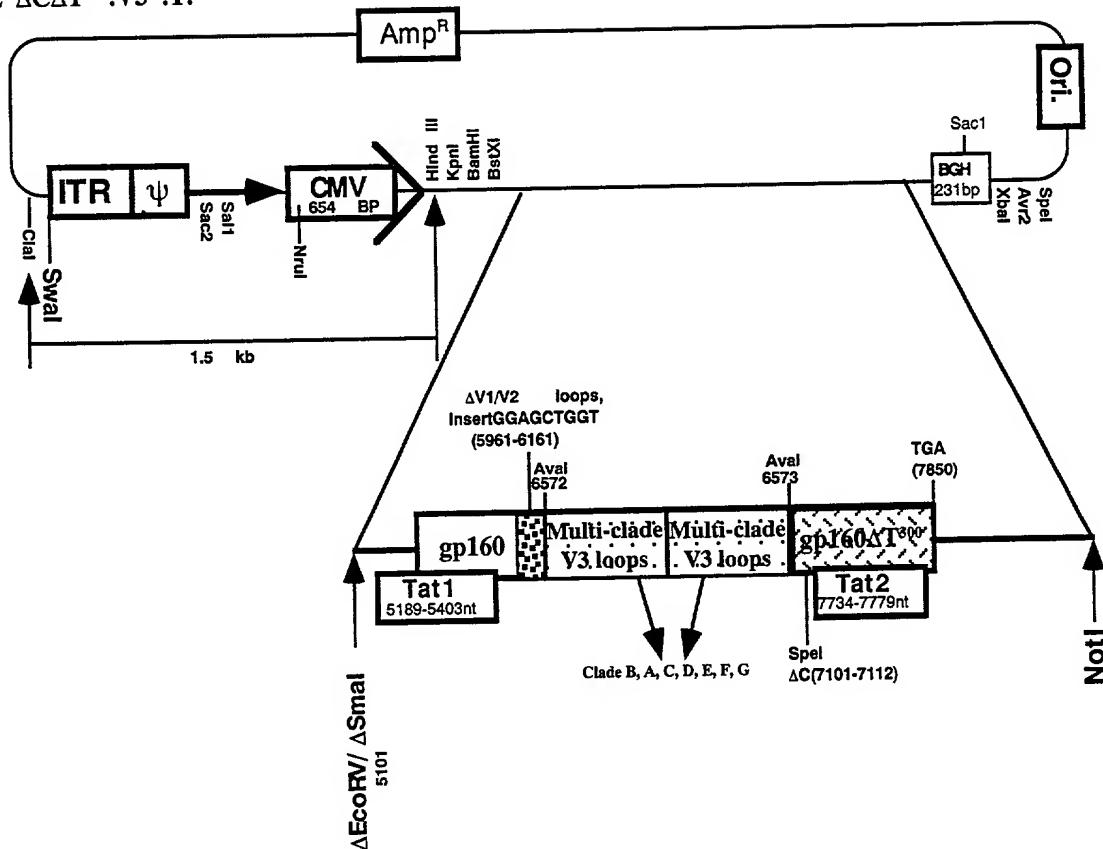
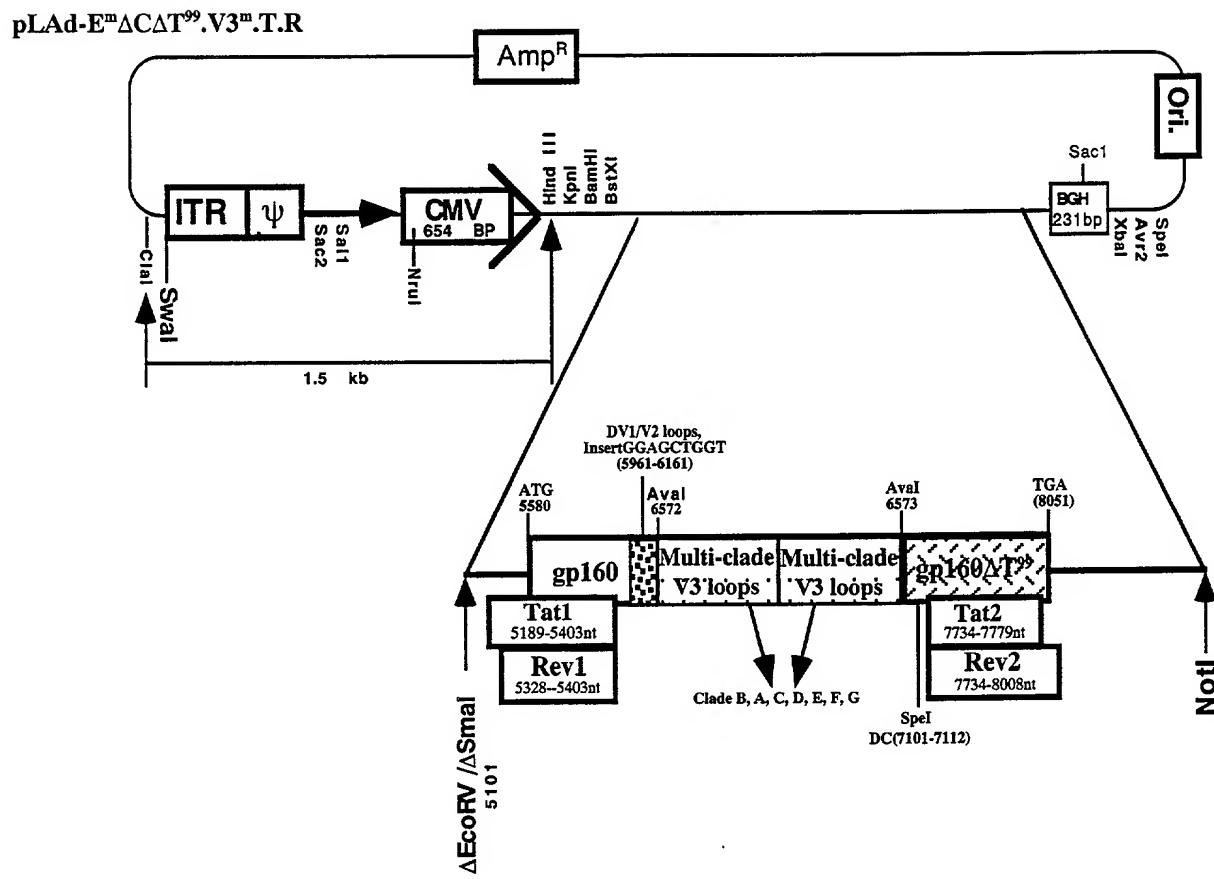


FIGURE 34



pRAD. ORF6-G.PI

FIGURE 35

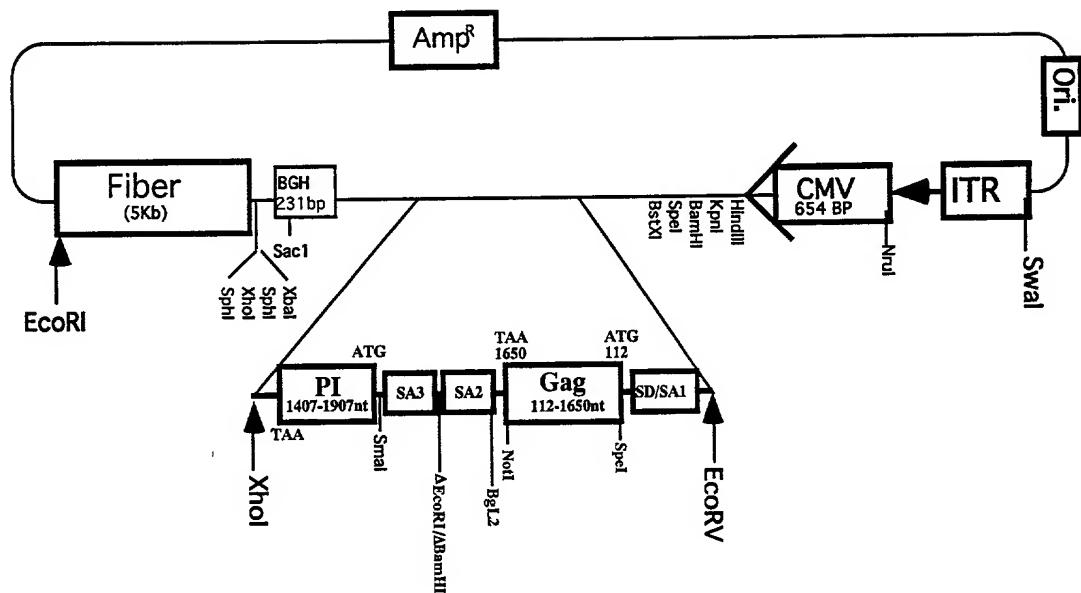
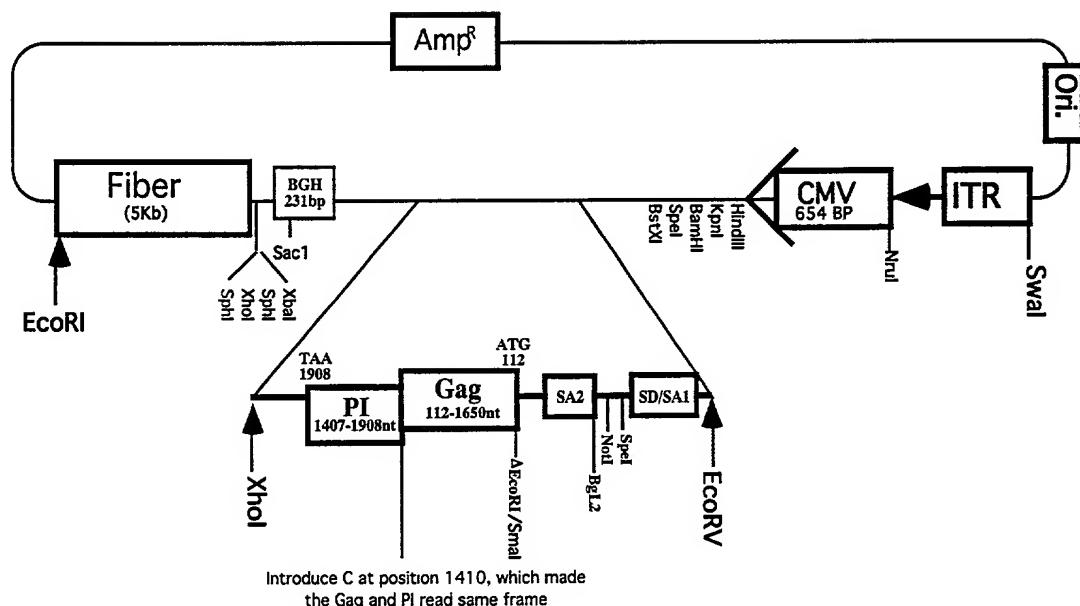


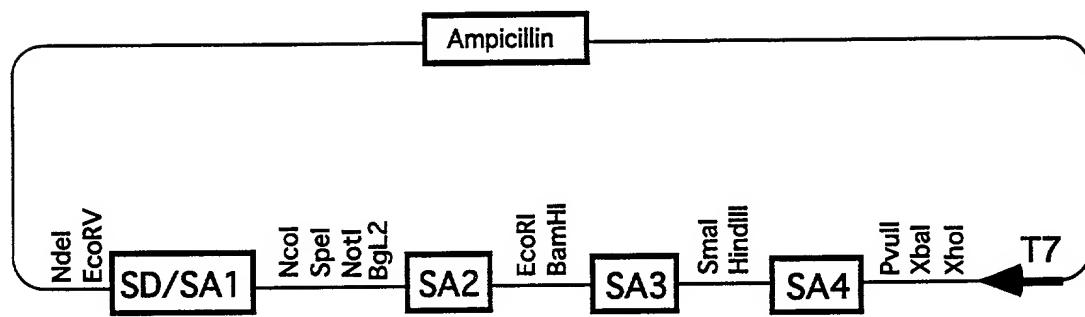
FIGURE 36

pRAD. ORF6-G-PI



**FIGURE 37**

**SD/SA1.2.3 vector**



**FIGURE 38**

## DNA Sequence of Env/Tat/Rev from BH10 clone [SEQ ID NO: 14]:

Gaattctgcaacaactgctttatccatcccagaattgggtgtcgacat  
EcoRI  
agcagaataggcgttactcgacagaggagcaagaatggagccagtagatccatgcactagagccctgga  
agcatccaggaagtccgcctaaaactgcttgcattgttgcataaaaaagtggtttccatggccaa  
gtttgttccataacaaaaggcttaggcattccatggcaggaagaagcggagacagcgaagacctcc  
tcaaggcagtccgcactcatcaagttcttatcaaagcgttaatgtcaatgcacccataaaaa  
tagcaatagtagcatttagtgcataataatgcataatgtgtggccatgtatgcacccataaaaa  
agggaaaatattaagacaaaagaaaaatagcaggttattgtatgcataatagaaagacgcagaagacagtgg  
caatgagagtgaaggagaaaatcagcacttgcgtggagatgggggtggagatggggcaccatgccttggg  
atgttgcattgttagtgcataaaaaattgtgggtcacgtcttgcattatggggtacctgtgtggaaagga  
agcaaccaccactcttttgcattgtgcataagcataatgcacccataatgttggccca  
cacatgcctgttgcattgtgcataccacagaccccaacccacaagaagtgttgcataatgtgcacccaaaaattttaac  
atgtggaaaatgcataatgttgcataacagatgcattgtggatataatgcattttatggatcaagcctaaagcc  
atgtgtaaaatttacccactctgttttagtgcactgttgcattgttgcataatgcataataccata  
gtatgcgggagaatgataatggagaaggagagataaaaaactgccttgcataatgcacccata  
agaggtaaggtgcagaaagaatatgcatttttataaactgtatgcataataccataatgcataatgcata  
cagctatacgttgcataagttgcattgcacccactctgttgcattgttgcataatgcataatgcata  
ttccccatcattattgtgcggcggcgtgggggcattcttgcattgttgcataatgcataatgcata  
ggaccatgttgcataatgtcagcacagttgcataatgttgcattgttgcataatgcataatgcata  
gttgcattgttgcataatgttgcattgttgcataatgcataatgcataatgcataatgcata  
taatgttgcattgttgcataatgcataatgcataatgcataatgcataatgcataatgcata  
cgatccatccatcattgtgcggcggcgtgggggcattcttgcattgttgcataatgcataatgcata  
taacatttagtgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
ataataaaaacaataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
ggaggggaaatttttgcattgttgcataatgcataatgcataatgcataatgcataatgcata  
ctaaagggtcaataacactgcataatgcataatgcataatgcataatgcataatgcataatgcata  
atgtggcaggaaatgttgcataatgcataatgcataatgcataatgcataatgcataatgcata  
tacagggtgcattatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
gagatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
gcacccaccaaggcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
tgggttgcattgttgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
tattgttgcattgttgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
ctcacagtgcattgttgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
gctcctgggatgggttgcattgttgcataatgcataatgcataatgcataatgcataatgcataatgcata  
gtataataatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
acaagcttataacactgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
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taatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
cagggttgcattgttgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
agaagaagaagggtggagagagagacagacatgcataatgcataatgcataatgcataatgcataatgcata  
gggacgttgcggcgttgcattgttgcataatgcataatgcataatgcataatgcataatgcataatgcata  
attgtggacttgcggcgttgcattgttgcataatgcataatgcataatgcataatgcataatgcataatgcata  
tcaggagcttgcggcgttgcattgttgcataatgcataatgcataatgcataatgcataatgcataatgcata  
gggttatagaaggtagtgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
gaaaggatgggttgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
aaagaatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcataatgcata  
XhoI

XhoI

## **FIGURE 39**

### **DNA Sequence of IL-2 $\Delta$ X [SEQ ID NO: 15]:**

Tcactctttaatcactactcacagtaacacctcaactcctgccacaatgta  
caggatgcaactcctgtcttgcattgcactaagtcttgcacttgcacaaa  
cagtgcacctacttcaagttctacaaagaaaaacacagctacaactggagca  
tttactgctggatttacagatgattttgaatggaattaataattacaagaa  
tcccaaactcaccaggatgctcacatttaagtttacatgcccaagaaggc  
cacagaactgaaacatcttcagtgtct**t**gaagaagaactcaaacctctgga

$\Delta$ XbaI (cta  $\rightarrow$  ctt)

ggaagtgctaaatttagctcaaaggaaaaactttcacttaagaccaggga  
cttaatcagcaatatacgtaatagttcttggactaaaggatctgaaac  
aacattcatgtgtaatatgtatgatgagacagcaaccattgtagaatttct  
gaacagatggattacctttgtcaaagcatcatctcaacactaacttga

1.0003035 3.3.00000

## **FIGURE 40**

### **DNA Sequence of Env<sup>m</sup>ΔCAT<sup>300</sup> (HIV strain BH10) [SEQ ID NO: 16]:**

**Gaattcggccacccatgg**gagtgaaggagaaatcagcacttgtggagatg  
EcoRI Kozak NcoI  
ggggtggagatggggcaccatgctccttggatgttgcgtatctgtgtgtgtacagaaaaaa  
tttgtgggtcacagtcttattatgggtacctgtgtggaaaggcaaccaccactcttatttt  
gtgcacatcagatgctaaagcatatgatacagaggtacataatgtttggccacacatgcctg  
tgtaccacagaccccaacccacaagaagttagtattggtaatgtgacagaaaaattttac  
atgtggaaaaatgacatggtagaacagatgcgtgaggatataatcagttatggatcaaa  
gcctaaagccatgtgtaaaatttacccactctgtgttagttaaagtgcactgttggaa  
gaatgataactaataccatagtagtagcggagaatgataatggagaaaggagagataaaa  
aactgccttcaatatcagcacaagcataagaggtcagaaagaatatgcatttt  
tttataaacttgcataataccatagataatgataactaccagctatacgttgcataatgttgg  
taacacctcagtcattacacaggcctgtccaaaggatccttgcataatcccatacat  
tattgtccccggctgggtttgcattctaaaatgtataataagacgttcaatggaaacag  
gaccatgtacaatgtcagcacagtacaatgtacacatggattaggccagtagtatcaac  
tcaactgctgtttaatggcagtctggcagaagaagaggttagtattagatctgccaatttc  
acagacaatgctaaaaccataatagtacagctgaaccatctgttagaaattaattgtacaa  
gacccaacaacaatacaagaaaaatccgtatccagagaggaccaggagacattgt  
tacaataggaaaaataggaaatatgagacaagcacattgttaacattagtagagcaaaatgg  
aataacactttaaacagatagatagcaaaattaagagaacaattggaaataataaaacaa  
taatctttaagcagtcctcaggagggaccaggatgttaacgcacagttttattgtgg  
agggaaatttttctactgttaattcaacacaactgtttaatagtacttgggttaatagtact  
tggagtactaaagggtcaaataacactgaaggaagtgcacacaatcaccctccatgcagaa  
taaaacaaattataaacatgtggcaggaagttagaaaaagcaatgtatgcccctccatcag  
tggacaaaatttagatgttcatcaaatattacagggctgttattacaagagatgtggtaat  
agcaacaatgagtccgagatcttcagacctggaggagatgtggacaattggagaa  
gtgaatttatataatataaaagttagttaaaaattgaaccattaggagtagcaccaccaaggc  
aaagagaagagtggcagACTAGTgcagtggaaataggagctt

ΔCleavage site (**agagaaaaaaga**) → SpeI

tgttccttgggttcttggagcagcaggaagcactatggcgcagcgtcaatgacgctgac  
ggtacaggccagacaattattgtctgttatagtgcagcagcagaacaatttgctgagggt  
attgaggcgcaacagcatctgttcaactcacagtctgggcatcaagcagctccaggcaa  
gaatcctggctgtggaaagataccataaggatcaacagctcctgggatttgggttgctc  
tggaaaactcattgcaccactgctgtgccttggaaatgttagtggagtaataatctctg  
gaacagatttggaaataacatgacccatggatggagtggtggacagagaaaaattacaattacaaa  
gcttaatacactccttaattgaagaatcgaaaaccagcaagaaaaagaatgaacaagaatt  
attggaaatttagataatggcaagttgtggatttggatcataacaattggctgtgg  
tatataaaaattattcataatgtatgttagggcttggtaggttaagaatagttttgctg  
tactttctgttagtgaatagatgttaggcaggatattcaccattatcgtttcagacccacct  
cccaatcccgggggacccgacaggcccgaaggaatagaagaaggtggagagagagac  
agagacagatccattcgatttagtgaacggatccttagcacttatctgttaa

10003035 216104

## **FIGURE 41A**

### **DNA Sequence of Full length HIV-1 Gag [SEQ ID NO: 17]:**

ggctagaaggagagaggatgggtgcgagagcgtcagtattaagcggggag  
aattagatcgatggaaaaattcggttaaggccagggggaaagaaaaat  
ataaaattaaaacatatagtatggcaagcagggagctagaacgactacaac  
catcccttcagacaggatcagaagaacttagatcattatataatacagtag  
caaccctctattgtgtcatcaaaggatagagataaaagacaccaaggaag  
cttagacaagatagaggaagagcaaaacaaaagtaagaaaaagcacagc  
aagcagcagctgacacaggacacagcagtcaggtcagccaaaattacccta  
tagtgcagaacatccagggcaaattgttacatcagccatattcacctagaa  
ctttaatgcatggtaaaagttagtagaagagaaggcttcagcccagaag  
taataccatgtttcagcattatcagaaggagccaccccacaagattaa  
acaccatgctaaacacagtgggggacatcaagcagccatgcaaattgttaa  
aagagaccatcaatgaggaagctgcagaatggatagagtacatccagtgc  
atgcagggcctattgcaccaggccagatgagagaaccaagggaaagtgaca  
tagcaggaactacttagtacccttcaggaacaaaataggatggatgacaata  
atccacctatcccagttaggagaaatttataaaaagatggataatcctggat  
taaataaaatagtaagaatgtatagccctaccagcattctggacataagac  
aaggacaaaagaaccccttttagagactatgttagaccggttctataaaactc  
taagagccgagcaagcttcacaggagtaaaaaattggatgacagaaacct  
tggttgcggccataaggcaagagtttggctgaagcaatgagccaagtaacaa  
atacagctaccataatgtatgcagagaggcaattttaggaaccaagaaaga  
tggttaagtgtttcaattgtggcaaagaagggcacacagccagaaattgca  
ggcccttaggaaaaaggctgtggaaatgtggaaaggaaggacaccaaa  
tgaaagattgtactgagagacaggctaatttttaggaagatctggcctt  
cctacaagggaaggccagggatatttcttcagagcagaccagagccaaacag  
ccccaccattcttcagagcagaccagagccaaacagccccaccagaagaga  
gcttcaggtctgggttagagacaacaactccccctcagaagcaggagccga  
tagacaaggaactgtatccttaacttccctcagatcactcttgcaacg  
accctcgtaataa

### FIGURE 41B

### Amino Acid Sequence of HIV-1 (Strain BH10) Gag [SEQ ID NO: 18]:

W I S Q Q S H K T M H S N L G A Q T A M G W N Q T Q L  
R H G H E S V E A A V G T G Q R V A K M C C A L P P S  
D K T V E H M E G A R R M L R L L A H I N G Q F E P R  
L L Q C E G Q V E Q D P W I I T L P G T F K R N P T L  
E K L Y I T G V S H W E G I D K T G P A C K E G R T S  
G Y S L K D Q K L G E R I W L Y E L G T K R T P S T T  
G K P T D A I V A G A M Q R I F T A G N V P C R Q E L  
S K Q A L A N W S V A Q E K S R M K V T M A D G L V P  
L K L V A A Q A F T E G Q Y T D W L G V K R K K F G Y  
V G R T E Q V N M N E P L I P V N I Q Q R C M Y P S L \*  
S G E N K Q I L P L N A T E S Y K T C S Q N Q S P R E Q  
A P L Y T A P T I M I I S G Y D V K A M N R H P A F K S  
R R E L D K Y R V T T P T V M R E C T A R A G W T S D S  
G R S R I K Q S P L K A G I V P S P M A N H K K E E P D  
M I A L E S S I S D L H A P I E A N E L G G G P P E N

**FIGURE 42**

## DNA Sequence of E<sup>m</sup>ΔCΔT<sup>99</sup>.T.R (HIV strain pNL4-3) [SEQ ID NO: 19]:

ΔCleavage site (agagaaaaaaga) → SpeI

gtgtctggggagcagcaggaagactatggctgcacgtcaatgacgctgacggtaacggccagacaattatt  
gtctgatatagtgcagcagcagaacaatttgctgaggctattgaggcgcaacagcatctgttgcactcaca  
gtctgggcatcaaacagotccaggcaagaatcctggctgtggaaagatacctaaaggatcaacagctctgg  
ggattttgggttgcctggaaaactcattgcaccactgctgtgccttggatgcttagttggagtaataaattc  
tctggAACAGATTGGAATAACATGACCTGGATGGAGTGGACAGAGAAAATTACACAGCTTAATA  
CACTCCTTAATTGAAGAATCGCAAAACCAAGCAAGAAAAGAATGAACAAGAATTATTGGAATTAGATAAATGGG  
CAAGTTTGTGGAATTGGTTAACATAACAAATTGGCTGTGGTATATAAATTATTCTATAATGATAGTAGGAGG  
CTGGTAGGTTAACATAAGTTTGTGACTTCTATAGTGAATAGAGTTAGGCAGGGATATTCACTTAC  
TCGTTTCAGACCCACCTCCCAATCCCGAGGGGACCCGACAGGCCGAAGGAATAGAAGAAGGTGGAGAGA  
GAGACAGAGACAGATCCATTGATTAGTGAACCGGATCCTAGCACTTATCTGGACGATCTGCGGAGCCTGTG  
CCTCTTCAGCTACCAACCGCTTGAGAGACTACTCTGATTGTAACCGAGGATTGTGGAACTTCTGGACGCA  
GGGTGGGAAGCCCTCAAATATTGGTGGATCTCCTACAGTATTGGAGTCAGGAACATAAGAATAGTGTGTT  
ACTTGCTCAATGCCACAGCCATAGCAGTAGCTGAGTAA

### **FIGURE 43**

## DNA Sequence of E<sup>m</sup>ΔV<sub>12</sub>ΔCΔT<sup>99</sup>.T.R (Strain pNL4-3) [SEQ ID NO: 20]:

## **FIGURE 44**

## DNA Sequence of Env<sup>m</sup>ΔC.T.R.N (Strain BH10) [SEQ ID NO: 21]:

## FIGURE 45

### DNA Sequence of E<sup>m</sup>ΔC.N (Strain BH10) [SEQ ID NO: 22]:

**ΔCleavage site(agagaaaaaaga)→SpI**

agcagggaaagcactatggcgacgcgtcaatgacgcgtacaggcagacaattattgtctggatag  
 tgcagcagcagaacaatttgcgtgagggtattgaggcgcaacagcatctgttgcactcacagtctgggg  
 atcaaggcagctccaggcaagaatcctgctgtggaaagatacctaaaggatcaacagctcctggggattt  
 ggggtgcctggaaaactcattgcaccactgctgtgccttggatgctagttggagaataaaatctctgg  
 aacagatttggataaacatgacctggatggagtgacagagaattacaattacacaagcttaatacac  
 tccttaatttgaagaatcgaaaaccagacaagaaaagaatgaacaagaatttggattagataatggc  
 aagtttgtggattggtaacataacaaattggctgtgttatataaaatttataatgtatagtaggag  
 gcttggtaggttaagaatagttttgttactttctgttagtgaatagtagtttaggcaggatattcacca  
 ttatcggttcagacccacccatcccaatcccggggacccgcacaggccogaaggaatagaagaaggtgg  
 agagagagacagagacagatccattcgatttagtgaacggatccttagcacttatctggacgatctcgga  
 gcctgtgcctttcagctaccaccgcgttagagacttactcttgcattgtacggaggattgtggacttctg  
 ggacgcagggggtggaaagccctcaaataattgggtggatctccctacagtattggagttaggcactaaagaa  
 tagtgcgttagcttgcataatgccacagctatagcagtagctgagggggacagatagggtatagaagtag  
 tacaaggagcttataagagcttacccacatacctagaagaataagacacaggcttggaaaggattttgcta  
 taagatgggtggcaagtggtaaaaagtagtgcgtggatggcctgtgtaaaggaaagaatgagacgag  
 ctgcgcgcacgcacatgggtggagcgcacatctcgagacactagaaaaacatggagcaatcacaagtagc  
 aacacacgcacactaacaatgctgattgtgcctggctagaagcacaagaggaggaggagggtgggtttccagt  
 cacacccatggtaacccatggcaatttgcacccaaacgaaagacaagatattccctgatctgtggatctaccacaca  
 caaggctactccctgattag

### **FIGURE 46**

### DNA Sequence of E<sup>m</sup>ΔCAT<sup>300</sup>.T (BH10) [SEQ ID NO: 23]:

ΔCleavage site (agagaaaaaaga) → SpeI  
ttgggagcagcagaaggactatgggcgcagcgtcaatgacgctgacggtacaggccagacaattattgtc  
tggtagatgtcagcagcagaacaatttgcgtgaggctattgaggcgcaacagcatctgtcaactcacag  
tctggggcatcaagcagctccaggcaagaatctggctgtgaaaagatacctaaggatcaacagctcctg  
gggatttggggttgtctggaaaactcattgcaccactgctgtgccttggaatgctagttggagtaataa  
atctctggAACAGATTGGAATAACATGACCTGGATGGAGTGGGACAGAGAAATTACAATTACACAGT  
taatacactccttaattgaagaatcgccaaaccaggcaagaaaagaatgaacaagaattattgaatttagat  
aaatgggcaagttgtgaaattggtaacataacaaattgctgtgttatataaaattattcataatgt  
agtaggaggctgttaggttaagaatagttttgcgtactttctgttagtgaatagagtttaggcaggat  
attcaccattatcgtttcagacccaccccaatcccggagggacccgacaggcccgaaggaatagaagaa  
gaaggtggagagagagacagagacagatccattcgttagtgaacggatccttagcacttatctgttaa

Figure 47

### DNA Sequence of E<sup>m</sup>/E<sup>m</sup> (BH10) [SEQ ID NO: 24]:

## FIGURE 48

### Sequences of V3 loop Multi-clade HIV-1 Clones:

Clade	ACC#	HIV-1 Strain	From(nt)	To(nt)
B	M15654	BH10	885	992
A	U09127	192UG037WHO.01083hED	888	992
C	U09126	192BR025WHO.01093hED	876	980
D	U43386	192UG024.2	888	989
E	U08458	193TH976.17	894	998
F	U27401	193BR020.17	888	992
G	U30312	192RU131.9	885	989

Tgtacaagacccaacaacaatacaaaaaagtatccgtatccagagagga  
ccagggagagcatttgttacaataggaaaaataggaaatatgagacaagca  
cattgt **Clade B [SEQ ID NO: 25]**

Tgtaccagacctaacaacaatacaaaaaagtgtacgtataggaccagga  
caaacattctatgcaacaggtgatataataggggatataagacaagcacat  
tgt **Clade A [SEQ ID NO: 26]**

Tgtacgagacccaacaataatacaaaaaagtataaggataggaccagga  
caagcattctatgcaacaggagaaaataataggagatataagacaagcacat  
tgt **Clade C [SEQ ID NO: 27]**

Tgcacaaggccctacaacaatataagacaaaggaccccataggactaggg  
caagcactctataacaagaagaatagaagatataagaagagcacattgt  
**Clade D [SEQ ID NO: 28]**

Tgtaccagaccctccaccaatacaagaacaagtatacgtataggaccagga  
caagtattctatagaacacaggagacataacaggagatataagaaaagcatat  
tgt **Clade E [SEQ ID NO: 29]**

Tgtacaagacccaacaatacaaaaaagaatatctttaggaccagga  
cgagtattttatacagcaggagaaaataataggagacatcagaaaggcacat  
tgt **Clade F [SEQ ID NO: 30]**

Tgtaccagacctaataacaatacaaaaaagtataactttgcaccagga  
caagcgctctatgcaacagggtgaaataataggagatataagacaagcacat  
tgt **Clade G [SEQ ID NO: 31]**

## **FIGURE 49A**

**DNA sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 32]:**

Atgagagtgaaggagaaaatcagcaacttgtggagatggggcaccatgctccttggat  
gttcatgtttagtgcatacagaaaaattgtgggtcacagtctattatgggtacctgtgtggaaag  
caaccaccactctatgtgtcatcagatgctaaagcatatgatacagaggtacataatgtttggccaca  
catgcctgtgtacccacagaccccaaccacaagaagaatgtgacagaaaatttaacat  
gtggaaaatgacatggtagaaacagatgcatgaggatataatcagttatggatcaaagcctaaagccat  
gtgtaaaattaaccactctgtgtggagctggtagtttgtacacactca

V1, V2 deletion, GAG insertion

Cattacacaggcctgtccaaaggatcctttagccaattccatcattattgtgccccggctgggttttg  
cgattctaaaatgtataataaagacgttcaatggAACAGGACCATGTACAAATGTACAGCACAGTACATGT  
acacatggaaatttaggcagtagtatcaactcaactgtgttAAATGGCAGTCTGGCAGAAGAAGAGGTAGT  
aatttagatctgccaatttcacagacaatgtctaaaccataatagtacagctgaaccaatctgttagaaatta  
attgtacaagacccacaacaacaa

Start of Clade B

Tacaagaaaaatgtccgtatccagagaggaccaggagagcattgttacaatagggaaaataggaaata  
tgagacaaggcacattgtctcggtgttaccag

Insert a Aval site Clade A

Acctaacaacaatacaagaaaaatgtacgtataggaccaggacaacattctatgcaacaggtgatataa  
tagggatataagacaaggcacattgtttgtac  
Clade C

Gagacccacaataatacagaagaaaaatgtataaggataggaccaggacaaggcattctatgcaacaggagaaa  
taataggagatataagacaaggcacattgttg  
Clade D

Cacaaggccctacaacaatataagacaaaggccccataggacttagggcaagcactctataacaacaagaa  
gaatagaagatataagaagagcacattgttg  
Clade E

Taccagaccctccaccaatacaagaacaatgtatacgtataggaccaggacaaggattctatagaacaggag  
acataacaggagatataagaaaagcatattgtggatctgttacaagacccacaataacaagaaaaaga  
atatttttagg

BamHI clade F

Accaggacgagtattttatacagcaggagaataataggagacatcagaaaggcacattgtttgttaccagac  
ctaataacaatacaagaaaaatgtataacttt

Clade G

Tgcaccaggacaagcgctctatgcaacagggtgaaataataggagatataagacaaggcacattgtctcggt  
acatttagtagcaaaatggataacacttt

Insert a Aval

Aaaacagatagatgaaatataaggagaacaatttggaaataataaaacaataatctttaagcagtccctcag  
gaggggacccagaaattgttaacgcacagttttaatttgtggagggaaattttctactgttaattcaacacaa  
ctgttaatagtacttgtttatagtacttgtggactaaagggtcaataacactgaaggaagtgcac  
aatcaccccccattgtcagaataaaacaaattataaacatgtggcaggaaatggcaatgtatgccc  
ctcccatcgtggacaaatttagatgttcatcaaatttacaggctgttattacaagagatgtgtgt  
agcaacaatgtggcagatcttcagacctggaggaggatgtgggacaattggagaatgtgaaattata  
taaatataaaatgtggatataaccatttaggatgtggcaccaccaaggcaaaagagaatgtgtgcaga  
ctgtgcagtgg

Cleavage site mutation (SpeI)

Aataggagcttggccttgggtcttggggcagcaggcagggcactatggcgccagcgtcaatgacgctga  
cggtacaggccagacaattttgtctgttatgtgcagcagcagaacaatttgctgagggtattggcg  
caacagcatctgtgcactcacagtctggggcatcaagcagctccaggcaagaatctggctgtggaaag  
ataccctaaaggatcaacagctcctggggattttgggttgcgtggaaaactcattgcaccactgtgtgc  
cttggaatgttagtggagtaataatctctggaaacagatttggataacatgacctggatggagtgggac  
agagaaaatttggatataatggcaagttgtggatgtggatgggttacataacaatggctgt  
gttatataaaatgtggctgtgtgtctctccctctccctccaggccacggattcatgtcc  
ctgtga

GPI anchor

## FIGURE 49B

Amino acid sequence of modified Env including multi-clade V3 loops [SEQ ID NO: 33]:

M T T A A E I V S K V G A P F T F R Y P T T G N A N G A G V L T M R N R P L T N G Q V M S E W A R M V S C N S G F C Q S K N V R Y P A Y T N D N G N E K N T F E W C N S T F L L I Q P T L L Y T D V F L A E N C L T N T P A N T N R T I N E T I W N H N G Q S E E K L T L K L W W I D I D F M

V L Y D V F L A E N C L T N T P A N T N R T I N E T I W N H N G Q S E E K L T L K L W W I D I D F M

K L Y A P N W G P N T A I N I N T N G N R R T T I R I N K S S S E S S L A G V R Q L N M E K K F

E G G K T M D S I K H E I T G N G N E I I T G R I K G N T F T D V N E Y K F Q A L G A E E W S M

K M V A D W Q C P T G E V R K N D T I R E S D K G S D T I N W T G I I K R L A I Q I S W S A W S

Y L P Y P K S N I F I E Q K I T I R I Q D I I R D I I L I C F I K T F Y R G R E A W W D Q S L L

W S E V E V C I A G V R S I R V I R R I A P Y G A P H D S F W C A L G K T S S H A G S N E W L

H I W T P D K S Y G P V N I N K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W L

L C K E Q M P V C T V I Q R M S D I I P R G A L K A A I Q E T P Y L G V Q G L Q L S K I Q N L

R A A H V E V T P P S S V Q Q R R I Q G H G C P H G C S S F S R P T G I S T G L V K L N K F L

W T T N V Q K Q A C T A E R A I Q G A L C Q G G C Q L K G Y T I P R D E A M I L E L E Y N N S

G E T V L M L A G T Q N I G H G A P H G C V S R C A G L G C K K I D M P V G V Q R I Q T E I L

W W F T V D L K I S L D T R G Q C A T L P R R Y P A S Q E T N I Q N N V G S Q V K T N I L W L

R L L A N E P P A V L T C G L G C Q C A R Y T F R Y I E P S S I G G D G I A Q T L T W L E N L

G V C H T I C V L T N N R A C T T F R Y S T P T N T R F I Q N N I S W A A M N W D A N H L L Q

### **FIGURE 50A**

**1. DNA sequence of p17/24 in natural form [SEQ ID NO: 34]:**

atgggtgcgagagcgtcagtattaagcggggagaattagatcgatggaaaaattcggttaaggccagg  
ggaaagaaaaatataattaaaacatatacgatggcaagcagggagctagaacgattcgcagttatc  
ctggcctgttagaaacatcagaaggctgttagacaataactgggacagctacaaccatcccttcagacagga  
tcagaagaacttagatcattatataatacagtagcaaccctcttgcattgtgtcatcaaaggatagagataaa  
agacaccaaggaagcttagacaagatagaggaagagcaaaaacaaaagtaagaaaaaagcacagaagcag  
cagctgacacaggacacagcagtcaggtcagccaaaattaccctatacgatgcagaacatccagggcaaatg  
gtacatcaggccatatcacctagaactttaatgcattggtaaaagtagttagaagagaaggcttcagccc  
agaagtaatacccatgtttcagcattatcagaaggagccaccccaagattaaacaccatgctaaca  
cagtgaaaaacatcaagcagccatgcaatgttaaaagagaccatcaatgaggaagctgcagaatggat  
agagtacatccagtgcatgcaggccattgcaccaggccagatgagagaaccaagggaaagtgacatgc  
aggaactactgtacccttcaggaacaaataggatggatgacaaataatccacctatccctgatggagaaa  
tttataaaagatggataatctggattaaataaaaatagaagaaatgtatagccctaccagcattctggac  
ataagacaaggacaaaagaaccccttttagagactatgttagaccgggtctataaaactctaagagccgac  
agcttcacaggaggtaaaaattggatgacagaaaccttgttgcacccatgtgacatgtcaggagtagggag  
ctatttaaaagcattggaccagcggctacactagaagaaatgtgacagcatgtcaggagtagggag  
cccgccataaggcaagagtttgtaa

**2. DNA sequence of p17/24 in secreted form [SEQ ID NO: 35]:**

atgagactgtgaaggagaaatatcagcacttgtggagatgggggtggagatgg  
gp120 signal peptide  
ggcaccatgctccttggatgttgcgtatctgttagtgcgttggcgagagcg  
p17/p24  
tcagtattaagcggggagaattagatcgatggaaaaattcggttaaggccagggggaaagaaaaata  
taaattaaaacatatagtatggcagcaggagactagaacgattcgcatcccttcagacaggatcagaagaacttaga  
catcagaaggctgttagacaaatactggacagactacaaccatcccttcagacaggatcagaagaacttaga  
tcatttatataatacagttagcaacccttattgtgtgcataaggatagagataaaagacaccaaggaaagc  
tttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagcagcagctgacacaggac  
acagcagtcaggtcagccaaaattaccctatagtgcagaacatccagggcaatggtacatcaggccata  
tcacctagaactttaatgcattggtaaaagttagttagaagagaaaggcttcagcccagaagtaatacccat  
gttttcagcattatcagaaggagccacccacaagattaaacaccatgctaaacacagtgggggacatc  
aagcagccatgcaatgttaaaagagaccatcaatgaggaagctgcagaatggatagagtacatccagtg  
catgcagggcctattgcaccaggccagatgagagaaccaagggagtgacatagcaggaactactgtac  
ccttcaggaacaaataggatggatgacaaataatccacotatcccagtagggagaaatttataaaagatgg  
taatccctggattaaataaaatagaagaatgtatagccctaccagcattctggacataagacaaggacca  
aaagaaccttttagagactatgttagaccgggttctataaaactctaagagccgagcaagcttcacaggaggt  
aaaaaaattggatgacagaaaaccccttggatccaaaatgcgaacccagattgtaaagactatttaaaagatgg  
tgggaccagcggctacactagaagaaatgtacagcatgtcagggagtaggaggaccggccataaggca  
agatgttgcattttgtaa

### **FIGURE 50A -continued**

#### **1. DNA sequence of p17/24 in membrane form [SEQ ID NO: 36]:**

atgagagtgaaggagaaaatcagcacttgtggagatgggggtggagatgg  
gp120 signal peptide  
Ggcaccatgctccctggatgttatgtatctgttagtgcgtgtgcgagagcg  
P17/p24  
tcagtattaagcggggagaattagatcgatggaaaaattcggttaaggccaggggaaagaaaaata  
taaattaaaacatatagtatggcaagcaggagctagaacgattcgcagttatcctggcctgttagaaa  
catcagaaggctgttagacaatactgggacagctacaaccatccctcagacaggatcagaagaacttaga  
tcattatataatacagtagcaaccctctattgtgtcatcaaaggatagagataaaagacaccaaggaagc  
tttagacaagataagaggaagagcaaaaactaagaaaaaagcacagcaagcagcagctgacacaggac  
acagcagtcaggtcagccaaaattaccctatagtgcagaacatccagggcaatggatcatcaggccata  
tcacctagaactttaaatgcattgtggtaaaagttagttagaagagaaggcttcagcccagaagtaataccat  
gtttcagcattatcagaaggagccaccccacaagatttaaacaccatgttaaacacacagtgggggacatc  
aagcagccatgcaatgttaaaagagaccatcaatgaggaagctgcagaatggatagagtacatccagtg  
catgcagggcctattgcaccaggccagatgagagaaccaaggaaagtgcacatgcaggaactactgtac  
ccttcaggaacaaataggatggatgacaaataatccacctatcccagtagagaaatttataaaagatgga  
taatcctgggattaaataaaatagaatgtatagccctaccagcattctggacataagacaaggacca  
aaagaaccttttagagactatgttagaccggttctataaaactctaagagccgagcaagcttcacaggaggt  
aaaaaaattggatgacagaaaccttggatgtccaaatgcgaacccagattgtaaagactatttaaaagcat  
tgggaccagcggctacactagaagaaatgtacagcatgtcagggagtaggaggaccggccataaggca  
agagtttg  
ttattcataatgatgttaggaggcttggtaggttaagaatagttttgcgtacttctgttagtgaatag  
agttaggcaggatattcaccattatcggttccatccacccacccatccggaggataa  
gp41 transmembrane domain

## FIGURE 50B

**1. Amino acid sequence of p17/24 in natural form [SEQ ID NO: 37]:**

M	I	A	E	E	R	N	Q	Q	A	P	P	D	N	N	P	E	N	L	R
G	R	S	G	E	I	K	V	A	F	Q	M	V	I	P	K	K	Q	A	E
A	L	R	C	L	E	S	S	I	S	D	L	H	A	P	I	E	A	N	
R	R	E	R	R	I	K	Q	S	P	L	K	A	G	I	V	P	S	P	
A	P	L	Q	S	K	N	P	E	N	E	G	T	P	T	V	M	R	E	
S	G	E	I	L	D	K	Y	R	V	T	T	P	T	V	M	R	E	C	
V	G	R	L	Y	T	A	P	T	I	M	I	I	S	G	Y	D	V	K	
L	K	F	G	N	K	Q	I	L	P	N	M	N	E	P	L	I	P	V	
S	K	A	Q	T	E	Q	V	N	M	N	M	N	E	P	L	I	P	V	
G	K	V	L	V	A	A	Q	A	F	T	E	G	Q	Y	T	D	W	L	
G	Y	N	Q	A	L	A	N	W	S	V	A	Q	E	K	S	R	M	K	
E	K	P	P	T	D	A	I	V	A	G	A	M	Q	R	I	F	T	A	
L	L	G	S	L	K	D	Q	K	L	G	E	R	I	W	L	Y	E	L	
D	K	L	L	Y	I	T	G	V	S	H	W	E	G	I	D	K	T	G	
R	H	L	Q	C	E	G	Q	V	E	Q	D	P	W	I	I	T	L	P	
W	I	E	T	V	E	H	M	E	G	A	R	R	M	L	R	L	L	A	
K	W	S	S	Q	Q	S	H	K	T	M	H	S	N	L	G	A	Q	T	
E	V	T	G	H	E	S	V	E	A	A	V	G	T	G	Q	R	V	A	

**2. Amino acid sequence of p17/24 in secreted form [SEQ ID NO: 38]:**

W S G E I L D K Y Y R V T T P T V M R E T  
R A P L Q S K K N N N P E N E G T P R F Q M  
W R R E R R I K Q Q Q S P L K A G I V P S M \*  
G A L R C L E S S S S I S D L H A P I E A E L  
W G R S G E I K V V V A F Q M V I P K Q E V  
R A I A E E R N Q Q Q Q A P Q P D N N P E L R  
W S K W S S Q Q S S S S H K T M H S N L G A T A  
L C E V T G H E S S S S V E A A V G T G Q R A K  
H I W I E T V E H H H M E G A R R M L R L A H  
Q M R H L Q C E G G G G Q V E Q D P W I I T P G  
Y L D K L L Y I T T T G V S H H W E G I D K G P  
K M L L G S L K D D D Q K L G E R I W L Y L G  
E G E K P P T D A A A I V A G A M Q R I F A G  
V L G K V L V A A A A Q A F T E G Q Y T D L G  
K L G Y N Q A L A A A N W S V A Q E K S R K V  
R M S K A Q T E Q Q Q V N M N E P L I P V I Q  
M T L K F G N K Q Q Q I L P L N A T E S Y T C

**FIGURE 50B-continued**

1. Amino acid sequence of p17/24 in membrane bound form [SEQ ID NO: 39]:

W S G G E I L D K Y R V T T P T V M R E C T I V P  
R A P P L Q S K K N P E N E G T P R F Q D M F S L  
W R R R E R R I K Q S P L K A G I V P S P M L L H  
G A L L R C L E S S I S D L H A P I E A N E L V T  
W G R R S G E I K V A F Q M V I P K K Q A E V A Q  
R A I I A E E R N Q Q A P Q P D N N P E N L R F F  
W S K K W S S Q Q S H K T M H S N L G A Q T A V S  
L C E E V T G H E S V E A A V G T G Q R V A K I L  
H I W W I E T V E H M E G A R R M L R L L A H R P  
Q M R R H L Q C E G Q V E Q D P W I I T L P G L S  
Y L D D K L L Y I T G V S H W E G I D K T G P G Y  
K M L L L G S L K D Q K L G E R I W L Y E L G V G  
E G E E K P P T D A I V A G A M Q R I F T A G L Q  
K L G G Y N Q A L A N N W S V A Q E K S R M K V G R \*  
V L G G K V L V A A Q A F T E G Q Y T D W L G G V G  
R M S S K A Q T E Q V N M N E P L I P V N I Q V R R  
M T L L K F G N K Q I L P L N A T E S Y K T C I N P

**FIGURE 51A**

**1. DNA sequence of p17 in natural form [SEQ ID NO: 40]:**

atgggtgcagagcgtcagtattaagcggggagaattagatcgatggaaaaattcg  
gttaaggccagggggaaagaaaaatataaattaaaacatatagtatggcaagcaggg  
agctagaacgattcgcagttaatcctggcctgttagaaacatcagaaggctgttagacaa  
atactggacagctacaaccatccctcagacaggatcagaagaacttagatcattata  
taatacagttagacaaccctctattgtgtgcataaaggatagagataaaagacaccaagg  
aagcttagacaagatagaggaagagcaaaacaaaagtaagaaaaaagcacagcaagca  
qcaqctgacacacaggacacagcagtcaggtcagccaaaattactaa

**2. DNA sequence of p17 in secreted form [SEQ ID NO: 41]:**

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg  
gp120 signal peptide  
ggcaccatgctccttggatgttcatgtatctgttagtgctggtgcgagagcg  
p17  
tcagtattaagcggggagaatttagatcgatggaaaaattcggttaaggccagggg  
aaagaaaaatataataaaacatatagtatggcaagcagggagctagaacgattcg  
cagttatcctggcctgttagaaacatcagaaggctgtagacaataactggacagct  
caaccatccctcagacaggatcagaagaacttagatcattatataatacagtagcaac  
cctctattgtgtcatcaaaggatagagataaaagacaccaaggaagctttagacaaga  
tagaggaagagacaacaaaagtaagaaaaagcacagcaagcagcagctgacacagga  
cacacqcaqtcaggtcagccaaattactaa

### 3. DNA sequence of p17 in membrane bound form [SEQ ID NO: 42]:

atgagagtgaaggagaaatatcagcacttgtggagatgggggtggagatgg  
gp120 signal peptide  
ggcaccatgctccttggatgtttagtgcgtgtggatgtggatgtggatgtgg  
ggcaccatgctccttggatgtttagtgcgtgtggatgtggatgtggatgtgg  
p17  
tcagtattaaagcgggggagaatttagatcgatggaaaaattcggttaaggccaggggg  
aaagaaaaatataaattaaaacatatagtatggcaagcaggagctagaacgattcg  
cagttaatcctggcctgttagaaacatcagaaggctgttagacaataactggacagcata  
caaccatcccttcagacaggatcagaagaacttagatcattatataatacagtagcaac  
cctctattgtgtcatcaaaggatagagataaaagacaccaaggaagcttttagacaaga  
tagaggaagagcaaaacaaaagtaagaaaaagcacagcaagcagcagcagctgacacagga  
cacagcagtcaggtcagccaaaattac  
ttattcataatgatagtaggaggcttgttaggtttaaagaatagtttgctgtactttc  
tgttagtgaatagagtttaggcaggatattcaccattatcgttcagacccacccaa  
tcccgagggataa  
gp41 transmembrane domain

FIGURE 51B

**1. Amino acid sequence of p17 in natural form [SEQ ID NO: 43]:**

M	G	A	R	A	S	V	L	S	G	E	L	D	R	W	E	K
I	R	L	R	P	G	G	K	K	Y	K	L	K	H	I	V	W
A	S	R	E	L	E	R	F	A	V	P	G	L	L	E	T	S
E	G	C	R	Q	I	L	G	Q	L	P	S	L	Q	T	G	S
E	E	L	R	S	L	Y	N	T	V	T	L	Y	C	V	H	Q
R	I	E	I	K	D	T	K	E	A	A	D	K	I	E	E	Q
N	K	S	K	K	K	A	Q	A	A	A	D	T	G	H	S	S
Q	V	S	Q	N	Y	*										

**2. Amino acid sequence of p17 in secreted form [SEQ ID NO: 44]:**

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	G
T	M	L	L	G	M	L	M	I	C	S	A	G	A	S	G	V
L	S	G	G	E	L	D	R	W	E	K	I	R	R	E	P	G
K	K	K	Y	K	L	K	H	I	V	W	A	S	R	L	Q	R
F	A	V	N	P	G	L	L	E	T	S	E	G	C	R	Q	I
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	L
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	R	Y
N	T	V	A	T	L	Y	C	V	H	Q	R	I	E	I	S	T
K	E	A	L	D	K	I	E	E	S	Q	N	K	S	K	D	A
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	K	Y	*

**3. Amino acid sequence of p17 in membrane bound form [SEQ ID NO: 45]:**

M	R	V	K	E	K	Y	Q	H	L	W	R	W	G	W	R	G
T	M	L	L	G	M	L	M	I	C	S	A	G	A	S	G	V
L	S	G	G	E	L	D	R	W	E	K	I	R	R	E	P	G
K	K	K	Y	K	L	K	H	I	V	W	A	S	R	L	Q	R
G	Q	L	Q	P	S	L	Q	T	G	S	E	E	L	R	S	Y
N	T	V	A	T	L	Y	C	V	H	Q	R	I	E	I	S	T
K	E	A	L	D	K	I	E	E	S	Q	N	K	S	K	D	A
Q	Q	A	A	A	D	T	G	H	S	S	Q	V	S	K	Y	*
F	I	M	I	V	G	G	L	G	V	Y	P	I	F	Q	T	H
S	V	V	N	R	V	R	Q	G	G	S	L	S	F	Q	T	H
L	P	I	P	R	G	*										

**FIGURE 52B**

**1. Amino acid sequence of p24 in natural form [SEQ ID NO: 49]:**

M	P	I	S	A	I	S	P	E	N	L	K	A	G	I	V	P	S	P	M	*
R	T	L	S	V	T	D	H	E	N	P	L	A	P	I	P	R	F	Q	D	M
V	P	N	E	P	L	I	A	P	M	N	N	H	A	E	N	E	G	T	P	R
T	V	M	N	A	T	E	S	V	S	V	A	T	E	A	N	E	L	H	A	P
E	C	R	I	S	G	Y	D	Q	A	F	T	E	G	Q	P	Q	P	D	M	V
C	T	K	A	K	T	V	V	Q	I	M	N	N	M	Q	P	Q	P	D	N	P

## 2. Amino acid sequence of p24 in secreted form [SEQ ID NO: 50]:

### 3. Amino acid sequence of p24 in secreted form [SEQ ID NO: 51]:

M	T	Q	K	L	G	R	I	W	L	Y	E	L	G	V	G
R	M	G	V	S	H	E	G	I	D	K	T	G	P	G	Y
V	L	Q	E	O	P	W	I	I	T	L	P	G	L	S	
K	L	M	E	G	A	R	M	L	R	L	A	H	R	P	
E	G	V	E	A	A	G	T	G	Q	R	V	A	K	I	
K	M	H	K	T	M	S	N	L	G	A	Q	T	A	V	
Y	L	Q	A	P	Q	D	N	N	P	E	N	L	R	F	
Q	M	A	F	Q	M	I	P	K	K	Q	A	E	V	A	
H	I	I	S	D	L	A	P	I	E	A	N	E	L	V	
L	C	S	P	L	K	G	I	V	P	S	P	M	L	H	
W	S	P	E	N	E	T	P	R	F	Q	D	M	F	S	
R	A	R	V	T	T	T	V	M	R	E	C	T	I	V	
G	I	L	P	L	N	T	E	S	Y	K	T	C	I	N	
W	V	N	M	N	E	L	I	P	V	N	I	Q	V	R	
R	Q	A	F	T	E	Q	Y	T	D	W	L	G	G	V	
G	N	W	S	V	A	E	K	S	R	M	K	V	G	R	
W	N	W	A	G	A	Q	H	D	B	T	A	C	I	G	

## **FIGURE 53A**

### **DNA sequence of modified Env including multi-clade V3 loops and Tat [SEQ ID NO: 52]:**

Gaattctgcaacaactgctgttatccatttcagaattgggtgtcgacatagcagaataggcgt  
tactcgacagaggagagaagaa**atg**gagccagttagatcctagactagagccc

Tat1

Tggaagcatccaggaagtca~~g~~cctaaaactgctgtaccaattgtcattgtaaaaagtgttgctt  
tcattgccaagttgtt~~cata~~acaaaagccttaggc~~at~~tcctatggcaggaaga~~g~~cg~~g~~agac  
agc~~g~~acaagac~~c~~c~~t~~caaggc~~ag~~tc~~ag~~actcatcaagttcttatcaa~~g~~c~~g~~ta~~g~~ta~~g~~ta~~g~~  
catgtatgc~~a~~ac~~c~~tata~~c~~aaatag~~c~~aatag~~t~~at~~g~~cattag~~t~~at~~g~~caataata~~g~~caat~~g~~ta~~g~~  
tgtgtgtccat~~g~~taat~~c~~at~~g~~aaat~~t~~aggaaaatatta~~a~~ag~~c~~aaaagaaaat~~a~~gac~~c~~agg~~t~~aa  
ttgat~~a~~gactaa~~t~~agaa~~a~~ag~~g~~cagaag~~a~~act~~g~~ggca**atg**ag~~g~~at~~g~~aggagaaaat~~c~~ag~~c~~actt  
gtggagatgggg~~t~~ggagat~~g~~gg

Envelope

Gcaccatgctc~~c~~ttggatgtt~~g~~at~~g~~t~~c~~t~~g~~t~~c~~acagaaaaattgtgggtcacagtctat  
tatgggg~~t~~ac~~c~~t~~g~~t~~g~~gaagg~~a~~ag~~c~~acc~~a~~c~~t~~t~~g~~t~~g~~cat~~c~~ag~~t~~g~~c~~taa~~g~~cata  
tgatacagaggtacataatgttggcc~~c~~ac~~a~~c~~t~~gc~~c~~t~~g~~t~~g~~acc~~a~~g~~c~~cccc~~a~~cc~~c~~aca~~a~~ag  
aagt~~g~~tattggtaat~~t~~gt~~g~~acagaaaaatttta~~a~~cat~~t~~g~~g~~aaaaat~~g~~ac~~t~~g~~g~~ta~~a~~ac~~g~~at~~g~~  
catgaggatataat~~c~~ag~~t~~ttatggat~~c~~aa~~g~~c~~c~~t~~a~~ag~~c~~cat~~t~~g~~t~~aaaatta~~cc~~act~~c~~t~~g~~  
**tgttggagctggtagttgt**taac~~c~~ct~~a~~

Delete V1V2, insert Gly, Ala, Gly

gtcattacacag~~c~~ctgtccaaagg~~t~~at~~c~~tt~~g~~ag~~c~~caatt~~cc~~cata~~c~~attattgtgccccggc  
tgg~~ttt~~gc~~at~~t~~ct~~aaaat~~g~~taataa~~g~~ac~~g~~tt~~c~~at~~g~~gaacaggaccat~~g~~tacaa~~at~~gt~~c~~a  
gc~~c~~ac~~g~~tacaa~~t~~gt~~c~~ac~~a~~c~~t~~g~~g~~aa~~t~~agg~~c~~c~~g~~at~~t~~ca~~c~~act~~t~~g~~c~~t~~g~~tt~~a~~at~~g~~gc~~g~~t  
ct~~g~~g~~c~~agaagaagag~~g~~tag~~t~~att~~g~~at~~c~~g~~c~~caatt~~tc~~cac~~a~~g~~c~~aa~~t~~g~~c~~t~~g~~aaaaccataat~~g~~at~~g~~  
ac~~g~~ct~~g~~ac~~c~~caat~~t~~g~~t~~ag~~a~~at~~t~~at~~t~~gt~~a~~ca~~g~~ag

First multi-clade repeat

Acccaacaacaatacaagaaaaagtatccgtatccagagaggaccaggag~~g~~ac~~t~~ttt~~t~~ac~~a~~  
tagaaaaat~~g~~aaat~~t~~g~~g~~aca~~g~~ac~~c~~att~~t~~gt~~c~~tc~~g~~gt~~t~~t~~ac~~ca~~c~~act~~a~~aca~~a~~ata~~c~~ca  
agaaaaat~~t~~gt~~c~~at~~t~~g~~g~~at~~t~~agg~~g~~acc~~g~~aca~~a~~ac~~t~~ct~~t~~at~~g~~ca~~c~~ac~~g~~gt~~t~~ata~~t~~at~~g~~gg~~g~~at~~t~~  
aagaca~~g~~ac~~c~~att~~t~~gt~~t~~g~~g~~ac~~g~~ac~~c~~ca~~a~~ata~~t~~aca~~a~~agaaaaat~~t~~gt~~t~~ata~~g~~ggat~~t~~agg~~g~~acc~~g~~  
gaca~~g~~catt~~t~~at~~g~~ca~~c~~agg~~g~~aca~~a~~ata~~t~~agg~~g~~at~~t~~ata~~g~~aca~~g~~ac~~c~~att~~t~~gt~~c~~aca~~g~~  
cc~~c~~t~~a~~aca~~a~~ata~~t~~aca~~a~~agg~~g~~ac~~c~~cc~~c~~cat~~g~~act~~g~~gg~~g~~ca~~g~~c~~act~~t~~t~~ata~~c~~aca~~a~~aga~~g~~  
aat~~g~~aga~~g~~at~~t~~ata~~g~~ag~~g~~ac~~c~~att~~t~~gt~~t~~g~~g~~ac~~g~~ac~~c~~cc~~t~~cc~~ac~~ca~~a~~ata~~c~~aga~~g~~ac~~t~~ata~~c~~  
gt~~t~~at~~g~~agg~~g~~acc~~g~~aca~~g~~at~~t~~t~~c~~t~~a~~g~~g~~aca~~a~~ata~~c~~aga~~g~~aa~~t~~at~~t~~tt~~g~~agg~~g~~acc~~g~~ac~~g~~  
tgt~~g~~gat~~c~~ct~~g~~t~~a~~ca~~g~~ac~~c~~ca~~a~~ata~~c~~aca~~a~~agaaaaat~~t~~gt~~t~~ata~~g~~gg~~g~~ac~~t~~ata~~c~~aca~~a~~ata~~t~~  
aca~~a~~ata~~c~~aca~~a~~agaaaaat~~t~~gt~~t~~tt~~g~~g~~c~~acc~~g~~gaca~~a~~g~~c~~g~~c~~t~~c~~t~~a~~g~~g~~at~~t~~g~~g~~aa~~t~~ata~~t~~  
gg~~g~~at~~t~~ata~~g~~aca~~g~~ac~~c~~att~~t~~gt~~c~~cc~~g~~gg**tgt**acc~~g~~ac~~c~~taaca~~a~~aca~~a~~ata~~t~~

Second multi-clade repeat

Caagaaaaat~~t~~gt~~c~~at~~t~~g~~g~~acc~~g~~gaca~~a~~ac~~t~~tt~~t~~at~~g~~ca~~c~~ac~~g~~gt~~t~~ata~~t~~at~~g~~gg~~g~~at~~t~~  
ata~~g~~aca~~g~~ac~~c~~att~~t~~gt~~t~~g~~g~~ac~~g~~ac~~c~~ca~~a~~ata~~t~~aca~~a~~agaaaaat~~t~~gt~~t~~ata~~g~~ggat~~t~~agg~~g~~acc~~g~~  
agg~~g~~aca~~g~~ac~~c~~att~~t~~ct~~t~~at~~g~~ca~~c~~agg~~g~~aca~~a~~ata~~t~~agg~~g~~at~~t~~ata~~g~~aca~~g~~ac~~c~~att~~t~~gt~~c~~ca~~a~~  
gg~~g~~cc~~c~~t~~a~~aca~~a~~ata~~t~~aca~~a~~agg~~g~~ac~~c~~cc~~c~~cat~~g~~act~~g~~gg~~g~~ca~~g~~ac~~c~~t~~t~~ata~~c~~aca~~a~~aga~~g~~  
aga~~g~~at~~t~~ata~~g~~ag~~g~~ac~~c~~att~~t~~gt~~t~~g~~g~~ac~~g~~ac~~c~~cc~~t~~cc~~ac~~ca~~a~~ata~~c~~aga~~g~~ac~~t~~ata~~c~~  
ac~~g~~t~~c~~at~~t~~g~~g~~acc~~g~~gaca~~g~~at~~t~~t~~c~~t~~a~~g~~g~~aca~~a~~ata~~c~~aca~~a~~agaaaaat~~t~~gt~~t~~ata~~g~~gg~~g~~ac~~t~~ata~~c~~  
at~~g~~tg~~g~~gat~~c~~ct~~g~~t~~a~~ca~~g~~ac~~c~~ca~~a~~ata~~c~~aca~~a~~agaaaaat~~t~~gt~~t~~tt~~g~~agg~~g~~acc~~g~~ac~~g~~  
gt~~t~~at~~g~~tt~~t~~ata~~c~~g~~g~~g~~g~~aa~~t~~ata~~t~~agg~~g~~ac~~c~~at~~g~~g~~g~~aa~~t~~agg~~g~~ac~~c~~tt~~g~~gt~~t~~acc~~g~~gac~~c~~ta~~a~~  
ta~~a~~aca~~a~~ata~~t~~aca~~a~~agaaaaat~~t~~gt~~t~~tt~~g~~g~~c~~acc~~g~~gaca~~a~~g~~c~~g~~c~~t~~c~~t~~a~~g~~g~~at~~t~~g~~g~~aa~~t~~ata~~t~~

**FIGURE 53A-continued**

taggagatataagacaagcacattgtctcggaacatttagtagagcaaaatggaataaacactt  
AvaI site, end of two multi-clade repeat  
Aaaacagatagatagcaaattaagagaacaatttggaaataataaaaacaataatcttaaggcagt  
cctcaggaggggacccagaaattgtAACGcacagtttattgtggaggggattttctactgt  
aattcaacacaactgtttatagtacttggattatagtacttggagttactaaagggtcaaataaa  
cactgaaggaagtgacacaatcaccctccatgcagaataaaaacaattataaacatgtggcagg  
aagttaggaaaagcaatgtatgcccctccatcagtggacaaatttagatgttcatcaaataattaca  
gggctgctattaacaagagatggtgtaatagcaacaatgagtccgagatcttcagacctggagg  
aggagatatgagggacaattggagaagtgaattataaaatataaaagttagtaaaaattgaaccat  
taggagtagcaccaccaaggcaaagagaagagtggcagactagtcagtgaaataggagct  
ttgttccttgg

gp41, delete the 300 bp at C-terminal

**FIGURE 53B**

**Amino acid sequence of modified Env including multi-clade V3 loops and Tat**

**[SEQ ID NO: 53]:**

M	R	V	K	E	W	G	R	G	V	C	H	T	I	C	V	L	T	N	N	R	A	C	T	T	F	R	Y	S	T	P	T	P	A	N	T	N	R	T	I	N	E	T	I	W	N	H	N	G	Q	S	E	E	K	L	T	K	L	W	W	I	D	I	A	E	A		
T	T	A	A	E	I	V	S	C	N	S	G	F	C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	I	T	R	K	F	G	N	T	A	G	R	K	V	A	Q	A	R	G	S	R	N	L	M	I	D	
A	E	I	V	S	K	V	G	A	P	F	T	F	R	Y	P	T	T	G	N	A	N	G	N	T	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*		
T	T	A	A	E	I	V	S	C	N	S	G	F	C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*
A	E	I	V	S	K	V	G	A	P	F	T	F	R	Y	P	T	T	G	N	A	N	G	N	T	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*		
E	I	V	S	C	N	S	G	F	C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*				
I	V	S	K	V	G	A	P	F	T	F	R	Y	P	T	T	G	N	A	N	G	N	T	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*				
S	C	N	S	G	F	C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*							
C	N	S	G	F	C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*								
N	S	G	F	C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*									
G	F	C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*											
F	C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*												
C	Q	S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*													
S	K	N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*															
N	V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																	
V	R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																		
R	Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																			
Y	P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																				
P	A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																					
A	Y	T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																						
T	N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																								
N	D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																									
D	N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																										
N	G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																											
G	N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																												
N	E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																													
E	I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																														
I	I	T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																															
T	G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																	
G	R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																		
R	I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																			
I	K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																				
K	G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																					
G	R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																						
R	I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																							
I	R	D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																								
D	I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																										
I	I	L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																											
L	I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																													
I	C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																														
C	F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																															
F	I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																																
I	K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																																	
K	T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																																		
T	F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																																			
F	Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																																				
Y	R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																																					
R	G	R	E	A	W	W	D	Q	S	I	P	R	*																																																						
G	R	E	A	W	W	D	Q	S	I	P	R	*																																																							
R	E	A	W	W	D	Q	S	I	P	R	*																																																								
E	A	W	W	D	Q	S	I	P	R	*																																																									
A	W	W	D	Q	S	I	P	R	*																																																										
W	W	D	Q	S	I	P	R	*																																																											
W	D	Q	S	I	P	R	*																																																												
D	Q	S	I	P	R	*																																																													
Q	S	I	P	R	*																																																														
S	I	P	R	*																																																															
I	P	R	*																																																																
P	R	*																																																																	
R	*																																																																		

## **FIGURE 54A**

**DNA sequence of modified Env including multi-clade V3 loops, Tat and Rev  
[SEQ ID NO: 54]:**

gaattctgcaacaactgctgttatccatttcagaattgggtgtcgacatagcagaat  
aggcgttactcgacagaggagcaagaat**tg**gagccagtagatcctagactagagccc  
Tat1

tggaagcatccaggaagttagcctaaaactgctgtaccaattgtattgtaaaaagtg  
ttgcttcattgccaagttgtttcataacaaaagccttaggcattctc**atgg**cagga  
Rev1

agaagcggagacagcgacgaagacccctcaaggcagtcagactcatcaagttctcta  
tcaaagcagtaagttagtacatgtaatgcacccataaaatagcaatagtagcattagt  
atgcaataataatagcaataggtagtggccatagtaatcatagaatataaggaaaa  
tattaagacaagaaaaatagacaggtaattgatagactaatagaaagagcagaagac  
agtggca**atg**agagtgaaggagaaatcagcacttgtggagatgggggtggagatggg  
Envelope

Gcaccatgctcctggatgttatgtatctgttagtgcatacagaaaaattgtggtcaca  
gtctattatgggtacctgtgtggaaaggcaaccaccactctatttgcattcaga  
tgctaaagcatatgatacagaggtaataatgtttggccacacatgcctgttaccca  
cagaccccaacccacaagaagtagtattggtaatgtgacagaaaaatttaacatgtgg  
aaaaatgacatggtagaaacagatgcattgtggatcaaaggcct  
aaagccatgttaaaattaacccactctgttt**ggagctgg**tagttgttaacacctca

Delete V1V2, insert Gly,ala,gly

gtcattacacaggcctgtccaaaggatcccttggccaaattccatattgtgc  
cccggtgggtttgcattctaaaatgtataataagacgttcaatggaaacaggaccat  
gtacaaatgtcagcacagtacaatgtacacatggatttaggcaggtagtatcaactcaa  
ctgctgtttaatggcagtctggcagaagaagaggttagtaattagatctgccaatttcac  
agacaatgctaaaaccataatagtacagctgaaccaatctgttagaaattaatt**tg**tacaa  
g

First multi-clades repeat

Acccaacaacaatacaagaaaaagtatccgttatccagagaggaccaggagacatttg  
ttacaataggaaaaataggaaatatgagacaaggcacattgtctcggtgtaccagacct  
aacaacaatacaagaaaaagtgtacgtataggaccaggacaaacattctatgcaacagg  
tgatataataggggatataagacaaggcacattgttgcacatggaggacccaaataataca  
aaaaagtataaggataggaccaggacacattctatgcaacacaggagaaataatagga  
gatataagacaaggcacattgtgcacaaggccctacaacaatataagacaaaggacc  
cataggacttagggcaagcactctataacaagaagaatagaagatataagaagagcac  
attgttgcacatggaggacccctccaccaatacaagaacaagtatacgtataggaccagg  
gtattctatagaacaggagacataacaggagatataagaaaagcatattgtgatcctg  
tacaagacccaaacaacaatacaagaaaaagaatatctttaggaccaggacgagtatttt  
atacagcaggagaataataggagacatcagaaaggcacattgttgcacatggaggac  
aacaatacaagaaaaagtataactttgcaccaggacaaacgcgtctatgcaacagg  
aataataggagatataagacaaggcacattgt**ctcggt****tg**taccagacctaacaacaata

Second multi-clade repeat

caagaaaaagtgtacgtataggaccaggacaaacattctatgcaacagg  
gtatataagacaaggcacattgttgcacatggaggacccaaacaataatacaagaaaaagtat

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**FIGURE 54A-continued**

aaggataggaccaggacaaggcattctatgcaacaggagaataataggagatataagac  
aagcacattgtgcacaaggccctacaacaataagacaaggaccccataggacta  
gggcaagcactctataacaacaagaagaatagaagatataagaagagcacattgtgtac  
cagaccctccaccaataacaagaacaagtatacgtataggaccaggacaagtattctata  
gaacaggagacataacaggagatataagaaaagcatattgtggatcctgtacaagaccc  
aacaacaataacaagaaaaagaataatctttaggaccaggacgagtattttatacagcagg  
agaaataataggagacatcagaaaggcacattgtgtaccagacctaataacaatacaa  
aaaaagtataactttgcaccaggacaagcgcttatgcaacaggtgaaataatagga  
gatataagacaaggcacattgtctcgaacattagtagagcaaaatgaaataacacttt

AvaI site, end of two multi-clade repeat

Aaaacagatagatagcaaattaagagaacaatttggaaataataaaacaataatcttta  
agcagtccctcaggaggggacccagaaattgtaacgcacagtttaatgtggagggaa  
ttttctactgttaattcaacacaactgtttaatagtacttggtaatagtacttggag  
tactaaagggtcaaataaacactgaaggaagtgacacaatcaccctccatgcagaataa  
aacaattataaacatgtggcaggaagttaggaaaagcaatgtatgcccctccatcagt  
ggacaaatttagatgttcatcaaattacaggctgttattacaagagatgggtgtaa  
tagcaacaatgagtccgagatcttcagacctggaggaggatatgagggacaatttgg  
gaagtgaatttatataaaataaaatgatgataaaaattgaaccattaggagtagcacccacc  
aggcaaagagaaggtggcagactgtgcagtggaaataggagcttggcttgg

Delete the cleavage site, insert SpeI

gttcttggagcagcaggaaggcactatggctgcacgtcaatgacgctgacggcacagg  
ccagacaattattgtctgtatatagtgcagcagcagaacaattgtctgaggctatttag  
gchgcaacagcatctgttcaactcacagtctgggcatcaaacagctccaggcaagaat  
cctggctgtggaaagataacctaaaggatcaacagctcctgggattttgggtctctg  
gaaaactcattgcaccactgtgccttggaaatgtctgtggagtaataatctctg  
gaacagatttggataaacatgacactggatggagtggtggacagagaaattaacaattacac  
aagcttaataacactcctaattgaagaatcgcaaaaccagcaagaaaagaatgaacaag  
aattattggaaattagataatggcaagttgtggaaattggtaacataacaattgg  
ctgtgttatataaaattattcataatgatgatgatgatggaggcttggtaggttaagaatagt  
tttgctgtactttctatagtgaatagatgatggcaggatattcaccattatcgttc  
agaccacccatcccaatcccgaggggacccgacaggcccgaaggaatagaagaaggt  
ggagagagagacagagacagatccattcgattagtgaacggatccttagcacttatctg  
ggacgatctgcggagcctgtgcctttagtaccaccgcttggagagacttactcttga  
ttgttaacgaggattgtggaaacttctggacgcagggggtggaaagccctcaaatttgg  
tggaaatctcctacagtattggagtcaggaactaaagaatagtgtttaacttgctcaa  
tgccacagccatagcagtagctgagtaa

gp41, but 99 bp truncation at C-terminal

**FIGURE 54B**

**Amino acid sequence of modified Env including multi-clade V3 loops, Tat and Rev [SEQ ID NO: 55]:**

W W F T V D L K I S L D T R G Q C A T L P R R Y P A Y T N D N G N E K N T F E W C N S T F L L I Q P T L L Y F F E L L G L \*  
R L L A N E P P A V L T C G L G C Q C A R Y T F R Y P T T G N A N G A G V L T M R N R P L T N G Q V M S E W V S E S R R E E  
W K T W V H T C F N L F N P C P H G C Q T F C V T L C T T F R Y S T P T N T R F I Q N N I S W A A M N W D A N H L L I L I G H R Q A  
G E T V L M L A G T Q N I G H G A P H G C V S R C A G Q C A T L P R R Y P A S Q E T N I Q N N V G S Q V K T N I L W R P G N Y G S V  
W T T N V Q K Q A C T A E R A I Q G A L C Q G G C Q L G C Q C A R Y T F R Y I E P S S I G G D G I T Q T L T W L E N L S E V S L W A  
R A A H V E V T P P S S V Q Q R R I Q G H G C P H G C P H G C Q T F C V T L N R D N G Q S G R L G C Q L Y C I S Q T G Y P L F L Y I  
W S E V E V C I A G V R S I R V I R R I A P Y G A P H G A P H G C V S R C A G L G C K K I D M P V G V Q R I Q T E I V G R R L E Q A  
L C K E Q M P V C T V I Q R M S D I I P R G A L K A A I Q G A L C Q G G C Q L K G Y T I P R D E A M I L E L E Y N N L Q D I C V L T  
H I W T P D K S Y G P V N I N K G S D T R I K S R F Q R R I Q G H G C P H G C S S F S R P T G I S T D L V K L N K F G R P S L I L A  
Q M V D N N L T H N R V L S G R I K G R I R R I I T R V I R R I A P Y G A P H D S F W C A L G K T S S H A G S N E W G V G R S R N N  
Y L P Y P K S N I F I E Q K I T I R I Q D I I R D I I S D I I P R G A L K A A I Q E T P Y L G V Q G L Q L S K I Q N V R R D R T W L  
K M V A D W Q C P T G E V R K N D T I R E S D K G S D K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W I N P R L V W L  
E G G K T M D S I K H E I T G N G N E I I T G R I K G R I R R I I T R K F G N T A G R K V A Q A R G S R N L M V I D D I Y N  
K L Y A P N W G P N T A I N I N T N G N R R T T I R I T I R I Q D I I R D I I L I C F I K T F Y R G R E A W W D Q S I I P R D L K V  
V L Y D V F L A E N C L T N T P A N T N R T I N E T I N D T I R E S D K G S D T R I K S R F Q Q K G S L M L P V V A L Q I C N E Q W I N P R L V W L  
R M V S C N S G F C Q S K N V R Y P A Y T N D N G N E N G N E I I T G R I K G N T F T D V N E Y K F Q A L G A E E W L L H G I L A S  
M T T A A E I V S K V G A P F T F R Y P T T G N A N G N T N G N R R T T I R I N K S S S E S S L A G V R Q L N M E K K V T G L D E N

## **FIGURE 55A**

**DNA sequence of HIV-1 (strain BH10) Protease (PI, nt 1407-1907) [SEQ ID NO: 56]:**

atgttcttaggaaagatctggcctcataaggaaaggccaggaaatttcctcagagcagaccagagcca  
acagccccaccatttcagagcagaccagccaacagccccaccagaagagagacttcaggtctgggt  
agagacaacaactccccctcagaagcaggagccatagacaaggaactgtatcccttaactccctcagatc  
actcttggcaacgaccctcgtcacaataaagataagggggcaactaaaggaagctctattagatacagga  
gcagatgatacagtattagaagaaatgatgtttccaggaagatggaaaccaaaaatgataggggaaattgg  
aggtttatcaaagtaagacagtatgatcagatactcatagaaatctgtggacataaagctataggtacagtatt  
agttaggacctacacctgtcaacataattgaaagaaatctgttgactcagattggtgcactttaattttaa

## **FIGURE 55B**

**Amino acid sequence of HIV-1 (strain BH10) Protease (PI) [SEQ ID NO: 57]:**

M	F	F	R	E	D	L	A	F	L	Q	G	K	A	R	E	F	S
S	E	O	T	R	A	N	S	P	T	I	S	S	E	Q	T	R	A
N	S	P	T	R	R	E	L	Q	V	W	G	R	D	N	T	S	P
S	E	A	G	A	D	R	Q	G	T	V	S	F	N	F	P	Q	I
T	L	W	Q	R	P	L	V	T	I	K	I	G	G	Q	L	K	E
A	L	L	D	T	G	A	D	D	T	V	L	E	E	M	S	L	P
G	R	W	K	P	K	M	I	G	G	I	G	G	F	I	K	V	R
Q	Y	D	Q	I	L	I	E	I	C	G	H	K	A	I	G	T	V
L	V	G	P	T	P	V	N	I	I	G	R	N	L	L	T	Q	I
G	C	T	L	N	F	*											

## **FIGURE 56A**

### **DNA sequence of HIV-1 (strain BH10) Gag-PI [SEQ ID NO: 58]:**

Atgggtgcagagcgtcagtattaagcggggagaattgatgggaaaaattcg  
gttaaggccaggggaagaaaaatataattaaacatatagtatggcaagcagg  
agctagacgattcgcagttatccgctgtgttaacatcagaggctgtacaca  
atactggacagctacaccaccatccttcagaccagggatcagaagaacttgatcatttata  
taatacagtagcaacccctttattgtgcatcaaaaggaagatgataaaagacacccaagg  
aagcttttagacaagatgagggaagagcaaaacaaagtaagaaaaagcacacagcaag  
cagacgtgacacaccaggacacacgcagtcaggtcagccaaattaccctatagtgcagaca  
ccagggggcaaaatggtacaatcaggccatatcacccttagaaactttaatgcatggttaaag  
tagtagaaggaagggctttcagccccagtaatacccatgtttcagcatttcattcagaa  
ggagccaccccacaagatttaaacacccatgctaaacacagtggggggacaatcaagcagc  
catgcaaaatgttaaaagagaccaatgagggaagctgcagaaatggataggtacatc  
cagtgcatgcagggcctttatgcaccaggccagatgagggaaaccaaggggaaagtgacata  
gcaggaacatactagatttccttcaggaacaaataggatggatgcaacaaaaatccacctat  
cccccagtggagaaattttaaaagatggataatccttggataaataaatagtaagaa  
tgttagccctaccaggcattctggacataagcaagggacaaaagaccttttagagac  
tatgttagacccgttcttataaactcttaagagccgagcaagctttcacaggaggttaaaaaaa  
ttggatgacagaaacccttgtttggccaaatgcaaccccagatttgttaagacattttaaa  
aagcatttggacccagcggcttaacactgaaagaaatgatgcacagatgttcagggatgta  
ggacccggcccataaggcaagatttggctgtaagcaatgagcccaagtaacaaatacag  
tacccataatgatgcacagagggcaattttttaggaaaccaaaagatggtttaagttgtcagagg  
atttgtggcaaaaggggcacacacagcccccagatttggcccccttaggaaaaagggctgt  
tggaaatgtggaaaggaagggacaccaaaatgaaagatttgtactgagagacagggcttaat  
tttttagggaagatctggccttcccttaacagggaaggccagggaatttttctcagagg  
ccaggcccaacagccccccaccatttcttcaggacgagccacagccccccaccag  
agagagctttcagggtctggggtaaggacacaactccccctcaaggagggccgatag  
acaaggaaactgttactttaactccctcagatcactttggcaacgacccccctcgtc  
caataaaagatagggggcaactaaggaagctcttattgatgatcaggagggcagatgataca  
gttatttagagaaatgagtttgccaggaagatggaaaccaaaatgatagggggaattgg  
aggttttttaaaagtaagacgtatgatcagatactcagaaatctgtggacataaag  
ctataggttaacgttttaatttttaaat

## FIGURE 57

### Primers for multi-clade V3 loops:

Clade A: (1). forward primer A888F5 [SEQ ID NO: 60]:

5'-aaa tca acc gga att gaa ttc cct cgg gtg tac cag acc taa caa caa tac-3'  
EcoRI      Aval

(2). reverse primer A-CR3 [SEQ ID NO: 61]:

5'-att gtt ggg tct cgt aca aca atg tgc ttg tct tat atc ccc-3'

Clade C: (3). forward primer A-CF5 [SEQ ID NO: 62]:

5'-ggg gat ata aga caa gca cat tgt acg aga ccc aac aat ac-3'

(4). reverse primer C980R3 [SEQ ID NO: 63]:

5'-gtt gta ggg cct tgt gca aca atg tgc ttg tct tat atc -3'

Clade D: (5). forward primer D888F5 [SEQ ID NO: 64]:

5'-gat ata aga caa gca cat tgt tgc aca agg ccc tac aac-3'

(6). reverse primer D-ER3 [SEQ ID NO: 65]:

5'-gtt gga ggg tct ggt aca aca atg tgc tct tct tat -3'

Clade E: (7). forward primer D-EF5 [SEQ ID NO: 66]:

5' -ata aga aga gca cat tgt tgt acc aga ccc tcc acc-3'

(8). reverse primer E998R3 [SEQ ID NO: 67]:

5'-gta ttg ttg ttg ggt ctt gta caa caa tat gct ttt ctt ata tct cc-3'

Clade F: (9). forward primer F888F5 [SEQ ID NO: 68]:

5'-gga gat ata aga aaa gca tat tgt tgt aca aga ccc aac aac aat ac-3'

(10). reverse primer F-GR3 [SEQ ID NO: 69]:

5'-gtt att agg tct ggt aca aca atg tgc ctt tct gat gtc-3'

Clade G: (11). forward primer F-GF5 [SEQ ID NO: 70]:

5'-gac atc aga aag gca cat tgt tgt acc aga cct aat aac-3'

(12). reverse primer G989R3 [SEQ ID NO: 71]:

5'-aat aaa cta gtc tag acc ccc gag tct aga aca atg tgc ttg tct tat atc tcc-3'

AvaI      XbaI